OFFICE OF CURRICULUM, INSTRUCTION, & PROFESSIONAL DEVELOPMENT

MIDDLE SCHOOL COURSE OUTLINE

(Revised September 2011)

Department	Science	**Course Code**	4122
Course Title	Science 8 SDAIE		
Abbreviation	Sci 8 SDA	**Grade Level**	8
Course Length	1 year	**Co-requisites**	ELD English 3
Teacher Certification	BCLAD / BCC or CLAD / LDS / SB 395, 1969		

COURSE DESCRIPTION:

Eighth grade SDAIE science is designed specifically for the needs of English Language Learners (ELLs) who are at the High Intermediate and Early Advanced levels of listening, speaking, reading, and writing proficiency in English. Students in this course cover the same content and utilize the same basic textbook as their Fluent English Speaker counterparts. The course delivery varies in pacing, instructional methodology, and supplemental materials. It is designed to provide depth versus breadth of the content standards, while providing more comprehensible input and literacy development in the content area.

Eighth grade science is a standards and laboratory based program. Students should spend approximately forty percent (40%) of their class time on hands-on activities. Introductory principles of physics and chemistry will be explored in detail, with some related topics from earth and life sciences included. Constructivist methods of teaching are employed to ensure the best possible comprehension and retention or science concepts. Science activities will be based on the California Science Standards as delineated in the California Science Framework and will utilize the skills and techniques outlined in the Investigation and Experimentation Strand of the Content Standards.

GOALS: (Student needs this course is intended to meet)

- Students will learn all of the California State Standards for 8th Grade Science, which emphasize physical sciences. The use of well-designed, memorable experiences and the application of scientific knowledge and methodology are essential in helping students achieve appropriate comprehension of the content.
- Students will improve their ability to learn independently by drawing generalizations from science related articles, books, graphs, charts, and diagrams. Regular opportunities are provided for students to clearly communicate their understanding through oral and written explanations of science concepts.
- Students will study the applications of science in everyday life to inspire them to consider pursuing advanced studies in science and explore the wide variety of related career choices available.

ACADEMIC LITERACY IN SDAIE CLASSES FOR ELLs AT LEVEL 3 and LONG-TERM ENGLISH LEARNERS:

The ELD Standards of reading, writing, listening and speaking describe the linguistic pathway that ELLs take to achieve academic literacy in English. SDAIE content area classes play an important role in developing and strengthening students' progress towards this goal. Students should be encouraged to expand their English skills, even though grammatical and vocabulary approximations will occur during this process.

When content-area information and materials have been made comprehensible through instruction in the SDAIE class, ELLs at each level will progress through the following phases of developing academic literacy in English. The students' degrees of literacy in their primary language will significantly affect the pace that students move through these levels.

ELD Level 3

Upon entering ELD Level 3, students are increasing their control of academic English proficiency about topics that have been explicitly taught to them and some topics that may be new to them. There will be wide gaps in vocabulary. ELLs progressing through this level will:

- participate in group/class projects, discussions and presentations with simple sentences and complex sentences (with increasing accuracy and fluency when given modeling and constructive feedback)
- use content area reading strategies (especially pre-reading, KWL, academic participation cards, anticipation guides, Reciprocal Teaching and Question/Answer Relationships) to analyze concepts from taught texts and other course reading materials. By the end of level 3, ELLs are able to comprehend most texts written at 4th grade level. Students continue to need extensive modeling and direct instruction, especially when encountering figurative language and sentences with numerous clauses.
- respond to Curriculum Embedded Assessment prompts (read to them and clarified for
- them as needed) orally and with simple and complex sentence structures
- use writing in a variety of ways such as, but not limited to, class note-taking, learning logs, interactive notebooks, response logs, and completing student handouts, homework, and class projects. Students continue to need extensive modeling and direct instruction, especially when writing at differing formality levels for a variety of audiences.
- understand the need for using test-taking strategies (using taught vocabulary) on the required district/state assessments, such as, End of Course Exams (with alternate presentation and response), CST, and CELDT.

Long-Term English Learners

Long-term English learners demonstrate a significant gap between their oral English fluency (high) and their English literacy proficiency (low), even though they have had many years of instruction in English. ELLs progressing through this level will:

- participate in group/class projects, discussions and presentations with sentences that demonstrate conversational English proficiency
- need to be taught how to use content area reading strategies (especially pre-reading, KWL, academic participation cards, anticipation guides, Reciprocal Teaching and Question/Answer Relationships) to analyze concepts from taught texts and other course reading materials. Students need extensive modeling, direct instruction, and oral discussions before, during and after reading.
- respond to Curriculum Embedded Assessment prompts (clarified orally to them as needed). Students need extensive modeling, direct instruction, and oral discussions to move them beyond writing sentences that reflect only conversational English.
- use writing in a variety of ways such as, but not limited to, class note-taking, learning logs, interactive notebooks, response logs, and completing student handouts, homework, and class projects. Students continue to need extensive modeling and direct instruction, especially when writing at differing formality levels for a variety of audiences.
- understand the need for using test-taking strategies on the required district/state assessments, such as, End of Course Exams, CST, and CELDT.

CONTEXT: CONTENT SCOPE AND SEQUENCE

6th

Physical Sciences

Density (Qualitative) -------- (CA 8)
Energy
Temperature vs. Heat
Heat Transfer

Earth Sciences

Earth's Layers
Plate Tectonics
Mountain Building
Earthquakes, Faults, and Epicenters
Volcanoes
California Geology
Mechanical & Chemical Weathering
Minerals ---------- (LB)
Rock Cycle (Igneous, Metamorphic, and Sedimentary Rocks) ---------- (LB)
Sun's Effect on Weather
Convections
Solar Energy
Atmospheric Conditions
Natural Resources
Stratigraphy: Fossil Locations Rock (CA 7)
Geol. Timeline of Earth's History -----(CA 7)
Formation of Fossils ----------(CA 7)
Methods of Dating Earth's History ---(CA 7)

Life Sciences

Food Chains / Food Webs
Ecosystems
Human Impacts on Ecosystems --------- (LB)

Six Designated Lessons from Project ALERT Health Curriculum

7th

Life Sciences

Cell Similarities & Differentiation
Function of Cell Structures
Energy at the Cellular Level
Photosynthesis / Respiration
Mitosis
Genetics
DNA → RNA → Protein ---------- (LB)
Sexual / Asexual Reproduction
Meiosis ---------- (LB)
DNA, Genes, & Alleles
Dominant & Recessive Traits
Theory of Evolution
Natural Selection
Body Systems
Taxonomic Keys ---------- (LB)
Kingdoms & Major Phyla ---------- (LB)

8th

Physical Sciences

Observing and Defining Motion
Forces and their Effects
Gravity's Larges Scale Effects
Basic Atomic Theory
Periodic Table as a Tool
Metals, Non-metals, Inert Gases
Electrons beyond the Bohr Model
Ions and Isotopes
Physical & Chemical Properties
Element vs. Compound Properties
Chemical Bonding
Atoms and Ions Forming Solids
Phases and Molecular Motion
Chemical Formulas
Chemical Equations & Conservation of Matter
Exothermic vs. Endothermic
Acids, Bases, and pH
Density & Buoyancy
Light, Levers in the body, & Heart Function---- (CA 7)

Earth Sciences

Galaxies and Stars
Life Cycles of Stars (Nebular Theory, Novas, etc.)
Distances in Astronomy
Light Sources and Reflectors in the Universe
Cosmology (Universe Origin) -------- (LB)
Solar System

Life Sciences

Simple Machines and the Human Body ----------(CA 7)
Blood Pressure and Heart Valves---(CA 7)
Organic Chem. / Biochem.

Three Designated "Booster Lessons" from Project ALERT Health Curriculum

Notes regarding non-aligned content:

(LB) => Long Beach specific content; not found in CA Science Content Standards

(CA 7) => 7th grade content which has been moved to 6th or 8th grade to accommodate reduced science instruction in 7th grade

(CA 8) => 8th grade content which should be presented qualitatively in 6th grade to help explain convections and other Earth science related content

CONTEXT: SKILLS SCOPE AND SEQUENCE

Investigation and Experimentation:

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

6th

7a. Develop a hypothesis.
b. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
c. Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
d. Communicate the steps and results from an investigation in written reports and oral presentations.
e. Recognize whether evidence is consistent with a proposed explanation.
f. Read a topographic map and a geologic map for evidence provided on the maps and construct and interpret a simple scale map.
g. Interpret events by sequence and time from natural phenomena (e.g., the relative ages of rocks and intrusions).
h. Identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hillslope).

7th

7a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
b. Utilize a variety of print and electronic resources (including the World Wide Web) to collect information as evidence as part of a research project.
c. Communicate the logical connection among hypothesis, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
d. Construct scale models, maps and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).
e. Communicate the steps and results from an investigation in written reports and verbal presentations.

8th

9a. Plan and conduct a scientific investigation to test a hypothesis.
b. Evaluate the accuracy and reproducibility of data.
c. Distinguish between variable and controlled parameters in a test.
d. Recognize the slope of the linear graph as the constant in the relationship y=kx and apply this to interpret graphs constructed from data.
e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
f. Apply simple mathematical relationships to determine one quantity given the other two (including speed = distance/time, density = mass/volume, force = pressure x area, volume=area x height).
g. Distinguish between linear and non-linear relationships on a graph of data.

CA CONTENT STANDARDS

Grade 8 Focus On Physical Science:

Motion

1. The velocity of an object is the rate of change of its position. As a basis for understanding this concept, students know:
    a. position is defined in relation to some choice of standard reference point and a set of reference directions. [CST]
    b. average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary. [CST]
    c. how to solve problems involving distance, time, and average speed. [CST]
    d. the velocity of an object must be described by specifying both the direction and the speed of an object. [CST]
    e. changes in velocity may be due to changes in speed, direction, or both. [CST]
    f. how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction. [CST]

Forces

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

Structure of Matter

3. 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:
    a. the structure of the atom and how it is composed of protons, neutrons and electrons. [CST]
    b. compounds are formed by combining two or more different elements. Compounds have properties that are different from the constituent elements. [CST]
    c. atoms and molecules form solids by building up repeating patterns such as the crystal structure of NaCl or long chain polymers. [CST]
    d. the states (solid, liquid, gas) of matter depend on molecular motion. [CST]
    e. 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. [CST]
    f. how to use the Periodic Table to identify elements in simple compounds. [CST]

Earth in the Solar System (Earth Science)

4. 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:
    a. galaxies are clusters of billions of stars, and may have different shapes. [CST]
    b. the sun is one of many stars in our own Milky Way galaxy. Stars may differ in size, temperature, and color. [CST]
    c. how to use astronomical units and light years as measures of distance between the sun, stars, and Earth. [CST]
    d. 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. [CST]
    e. the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids. [CST]

Reactions

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept, students know:
    a. reactant atoms and molecules interact to form products with different chemical properties. [CST]
    b. 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. [CST]
    c. chemical reactions usually liberate heat or absorb heat. [CST]
    d. physical processes include freezing and boiling, in which a material changes form with no chemical reaction. [CST]
    e. how to determine whether a solution is acidic, basic or neutral. [CST]

Chemistry of Living Systems (Life Science)

6. Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept, students know:
    a. 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. [CST]
    b. living organisms are made of molecules largely consisting of carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur. [CST, LS10]
    c. 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. [CST, LS10]

Periodic Table

7. 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:
    a. how to identify regions corresponding to metals, nonmetals and inert gases. [CST]
    b. 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. [CST]
    c. substances can be classified by their properties, including melting temperature, density, hardness, heat, and electrical conductivity. [CST]

Density and Buoyancy

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

Note: This section has been moved to 8th grade in Long Beach to accommodate single-semester 7th grade science programs.

Physical Principles in Living Systems (Physical Science) (CA 7th Grade Standard Set)

6. Physical principles underlie biological structures and functions. As a basis for understanding this concept, students know …

   a. visible light is a small band within a very broad electromagnetic spectrum.

   b. that for an object to be seen, light emitted by or scattered from it must be detected by the eye.

   c. light travels in straight lines if the medium it travels through does not change.

   d. how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.

   e. that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.

   f. light can be reflected, refracted, transmitted, and absorbed by matter.

   g. the angle of reflection of a light beam is equal to the angle of incidence.

   h. how to compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints).

   i. how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.

   j. that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system. [LS10]

Investigation and Experimentation

9. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content the other three strands, students should develop their own questions and perform investigations. Students will:

   a. plan and conduct a scientific investigation to test a hypothesis. [CST]

   b. evaluate the accuracy and reproducibility of data. [CST, LS10]

   c. distinguish between variable and controlled parameters in a test. [CST, LS10]

   d. recognize the slope of the linear graph as the constant in the relationship y=kx and apply this to interpret graphs constructed from data. [CST]

   e. construct appropriate graphs from data and develop quantitative statements about the relationships between variables. [CST]

   f. apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure x area, volume = area x height). [CST]

   g. distinguish between linear and non-linear relationships on a graph of data. [CST]

CST = Standards assessed on the California Standards Test
LS10 = Standards assessed on the 10th grade No Child Left Behind Biology/Life Science Test

DISTRICT PERFORMANCE STANDARDS:

The Long Beach Unified School District has common assessments and assignments that are required for eighth grade science. The Performance Standard Criteria are shown in the table below. The objective is to have all students achieve at or above the Proficient Level and receive a C or better in the course. Performance level is determined by the average of the assessments or assignments.

Science Performance Standard Criteria

	Not Proficient	**Partial Proficient**	**Proficient**	**Advanced Proficient**
Graded Student Work	Average is a 1 or less than 60%	Average is a 2 or 60% - 69%	Average is a 3 or 70% - 84%	Average is a 4 or 85% - 100%
Standards-Based Classroom Assessments	Less than 60%	60% - 69%	70% - 84%	85% - 100%
Written Response / Lab Report / OES (6 point scale)	1-2	3	4	5-6
Written Response / Lab Report / OES (4 point scale)	1	2	3	4
End-Of-Course Exam	Less than 45%	45% - 59%	60% - 84%	85% - 100%

STATE PERFORMANCE STANDARDS:

The California State Board of Education has identified the following performance levels for the California Standards Test (CST) in 8th Grade Science. The objective of Long Beach Unified School District is to have all students achieve at or above the Proficient Performance Standard (Level). The table below indicates the estimated percent correct (based on 2007 CST data) and the Scaled Score (SS) on the Content Standards Test.

Far Below Basic	**Below Basic**	**Basic**	**Proficient**	**Advanced Proficient**
Less than 33%	**33% - 45%**	**46% - 58%**	**59% - 72%**	**73% - 100%**
SS 150 – 252	**SS 253 – 299**	**SS 300 – 349**	**SS 350 – 402**	**SS 403 – 600**

OUTLINE OF CONTENT AND RECOMMENDED TIME ALLOTMENT:

Content sequencing and time allocations are only suggestions and may be adjusted to suit school site curriculum plans and student needs.

SCIENCE 8

Notes about Glencoe materials:

1. Each Chapter "Fast File" includes lab worksheets, review worksheets, etc. to support the text.
2. The Presentation Disc includes all transparencies so that they can be show using an LCD projector.
3. Video Labs on the "Super DVD" are different from the labs in the textbook. Pause or stop the video before showing "Expected Outcomes" until the students have conducted their own experiments.

Density and Buoyancy *8% CST*

8. All objects experience a buoyant force when immersed in a fluid.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… density is mass per unit volume. **(8,a)** [CST] **DISTRICT ASSESSMENTS:** PT: Density Rocks! **MODIFIED ASSESSMENTS:** Students make another study card (Flash Card) for a new formula: **l** x **w** x **h = volume** (in cubic centimeters or cm^3) Partners measure various 'regular' solids to calculate their volume. They then measure and record in grams (g) the mass of the previous regular solids on the triple beam balance. Then calculate and record the density of the same regular solids using the density formula: **D = m/v** Students make study flash card for this equation, too.	• Recall that density is calculated by dividing the mass of some quantity of material by its volume. • Explain that density is independent of the quantity of the substance. *(i.e., A cubic centimeter of a substance has the same density as a cubic kilometer.)* • Explain that density may be expressed in any units of mass and volume. • Recall that most common units for density are grams per cubic centimeter (g/cc or g/cm^3) for solids and grams per milliliter (g/mL) for liquids. (Note: 1 cm^3 = 1 mL)	**Focus on PS, Ch 3:1** *PH FoPS, Ch 3:3*	***KEY VOCABULARY:*** density, mass, volume, units, gram, milliliter, cubic centimeter ***GRAPHIC ORGANIZERS:*** Circle Map:Density ***SKILLS FOCUS:*** identify units, measure Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Applying Math, "Density Equation to find Mass and Volume", p. 138 • **Density of Water Lab** Student pairs or groups measure masses of five or more water samples, each with different volume. Calculate and compare density of all samples. Identify possible sources of error.	1 Day

Density and Buoyancy

8% CST

8. All objects experience a buoyant force when immersed in a fluid.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… how to calculate the density of substances (regular and irregular solids, and liquids) from measurements of mass and volume. **(8,b)** [CST] **DISTRICT ASSESSMENTS:** PT: Density Rocks! **MODIFIED ASSESSMENTS:** Lab Skill Test (Practicum): Students determine the tare mass of various irregular objects in containers using the triple beam balance and record their calculations. They then determine volume of the irregular solids by using water displacement and calculate the density. Students are assessed on measurements and calculations.	• Determine mass by placing material on a balance or scale and subtracting the mass of its container. • Determine the volume of a liquid by using a graduated cylinder. • Determine the volume of a geometrically regular solid by measuring with a ruler and applying the appropriate geometry formula. • Determine the volume of an irregular shaped solid by measuring water displacement.	**Focus on PS, Ch 3:1** **Also, Tools of the Physical Scientist:** "Graduated Cylinder", **p. 10** "Triple-beam Balance", **p. 11** *PH FoPS, Ch 3:3 and 14:2*	***KEY VOCABULARY:*** quantity regular **volume** irregular ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: regular shaped solid vs. irregular shaped solid Flow Map: Steps of how to calculate density of a regular shaped solid ***SKILLS FOCUS:*** measure, calculate Construct appropriate graphs from data and develop quantitative statements about the relationships between variables. **(I&E 9.e)** Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including density = mass/volume). **(I&E 9.f)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Data Lab, "Calculate Density", p. 139 • **Density Cubes Lab** Obtain cubes of various materials (metals, plastics, woods) with similar volumes. Measure and compare masses and densities. Extend by determining densities of irregular shaped solids of similar the same materials, determining the volume by immersion in graduated cylinder.	2 Days

Structure of Matter 15% CST

3. Each of the more than 100 elements have distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… the structure of the atom and know it is composed of protons, neutrons and electrons. **(3,a)** [CST] **DISTRICT ASSESSMENTS:** CR: Biography of an Atom **MODIFIED ASSESSMENTS:** Students draw and label the structure of an atom. Students construct a three-dimensional model of an assigned atom using clay, Play-Doh, marshmallows, and/or other soft materials. This model will be presented to class as if the student is the element, speaking in first person. Information that needs to be presented: • name and symbol of element • number of protons, neutrons, and electrons • how the proton number makes the element unique • placement of electrons in orbitals	• Describe the structure of the atom as having mostly empty space with a tiny, massive nucleus at its center. • Identify the proton, neutron, and electron as the major particles that make up atoms. • Recall that the each element is made up of one type of atom, which is determined by the number of protons in the nucleus. • Explain that each electron has a definite energy that keeps it moving around the positive nucleus to which it is attracted. • Describe how electrons fill up orbitals at different energy levels (which the Bohr "solar" model oversimplifies). • Explain how the experiments of Ernest Rutherford and Neils Bohr helped develop our understanding of the atom using indirect evidence; and that today's modern equipment, which can make more direct observations of the atom, has confirmed their inferences.	**Focus on PS, 4:1,2** *PH FoPS, 14:3 and 18:1*	***KEY VOCABULARY:*** **Atom** **neutron** **nucleus** **energy** **electron** **orbital** **proton** mass electrical charge ***GRAPHIC ORGANIZERS:*** Circle map (brainstorm) of atom TripleVenn Diagram: proton vs. neutron vs. electron Tree Map: structure of atom Reciprocal Teaching Reading Strategy: *Predicting, Clarifying, Summarizing and Questioning*. ***SKILLS FOCUS:*** Modeling, evaluation Evaluate the accuracy and reproducibility of data. **(I&E 9.b)** ***LABS / DEMOS / VISUALS:*** • **Diagramming Atoms** Students practice drawing energy level diagrams of the first 20 elements. • Focus on PS, Design Your Own Lab, "Build an Atom" pp 204-5 • Focus on PS, Launch Lab, "What's in the Box?" p 171 • **Bohr's Atom Cards** Students work in groups to create a "deck" of 20 cards showing energy level diagrams of elements 1-20. Arrange cards in the pattern of the Periodic Table. Students examine the diagrams to identify patterns explaining why the elements are arranged as they are. • Focus on PS, Data Lab, "How do Atoms Differ?" p 203 • Focus on PS, Mini Lab, "How Big are the Particles?" p 181	2 Days

Structure of Matter (cont'd) *15% CST*

3. Each of the more than 100 elements have distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements. **(3,b)** [CST] **DISTRICT ASSESSMENTS:** CR: What's the Matter? **MODIFIED ASSESSMENTS:** Individuals or pairs are able to sort elements from compounds when given cards with examples of each. Small groups categorize which properties are physical and which are chemical when given a list or series of pictures and or descriptions. Small groups are divided into either ionic or covalent bond groups. Each group presents a skit, poster or analogy that shows, explains, or demonstrates their particular bonding process. Examples of different compounds with their formulas are presented. Students are given cards with formulas of either ionic or covalent bonds. They must name the elements in each formula and sort each card by its type of bonding. Small groups compare and contrast ionic and covalent bonding by dramatization, cartoon, advertisement, or poster.	• Explain how ionic bonds form. • Explain how covalent bonds form. • Define compounds as combinations of two or more elements that have physical and chemical properties that are usually different from that of their constituent elements. • Describe examples of ionic compounds made from metals and non-metals and organic (covalent) compounds made from carbon and other elements. *(Note: At this point, the focus is on how and why atoms combine, not on products and reactants, nor on balancing equations. Standards 5a and 5b will address this again in the context of chemical reactions.)*	**Focus on PS, 5:1** *PH FoPS, 14:1, 18:3, 18:4, and 17:2*	***KEY VOCABULARY:*** **compound, covalent bond, chemical bond, chemical reaction, ionic bond, molecule** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: ionic bond vs. covalent bond Tree Map: chemical bonding, chemical reactions, ionic bond, covalent bond, elements, compounds, metals, and nonmetals (showing their connections). Bridge Map: An element is to a compound as a ___ is to a ___. Circle Map: bonding ***SKILLS FOCUS:*** Modeling, observation, experimentation Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • **Create models of simple chemical reactions** where atoms or elements combine to form molecules. Have students research the properties of the elements and the resulting compound. They may also research where the reaction takes place in nature or in human applications. (Adapted from CA Science Framework, p 135. The activity in the Framework is actually more relevant to standard 5a and 5b.) • Focus on PS, Launch Lab, "Structures Made of Atoms", p 215 • **Modeling Molecules** Students use molecular model kits to construct models of ionic and covalent compounds. • Focus on PS, Ch 5 Fast File, "Phlogiston or Oxygen?" p 17 • Focus on PS Lab Manual, "Chemical Bonds" pp 23-6 • Focus on PS, Presentation Disc Ch 5, CA Sci8 CIM_Covalent_Bond.avi, Animation: Covalent Bonding • Focus on PS, Presentation Disc Ch 5, CA Sci8 CIM_Ionic_Bond.avi, Animation: Ionic Bonding	5 Days

Structure of Matter (cont'd) *15% CST*

3. Each of the more than 100 elements have distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers. **(3,c)** [CST] **DISTRICT ASSESSMENTS:** PT: A Salty Situation **MODIFIED ASSESSMENTS:** Small Groups build either a model of a crystal (like NaCl) or a model of an organic polymer to present to the class. The presentation needs to explain the "why" of the particular shape and "how " this shape contributes to the chemical and physical properties.	• Identify and describe the structure of crystals of table salt as having a regular cubic structure with sodium and chlorine ions alternating in a three-dimensional array with the corners of the cubes forming the lattice. • Grow crystals from a solution and explain how this process leads to the building up of atoms on a lattice. • Identify and describe organic polymers as long, repetitive, and string like molecules with atoms of C, H, O, and N. • Construct models of crystals and organic polymers. • Explain how the shape of a molecule contributes to its chemical and physical properties. *(Note: The carbon chemistry that underlies organic polymers is specifically addressed in standard 6a. Specific, important biological polymers are addressed in standard 6c.)*	**Focus on PS, 5:2** *PH FoPS, 18:5, 20:1 and 21:2*	***KEY VOCABULARY:*** **three-dimensional array** crystal **physical property** **lattice** **chemical property** organic solution **polymer** **dissolving** ***GRAPHIC ORGANIZERS:*** Circle Map: crystals ***SKILLS FOCUS:*** Modeling, experimentation, observation Plan and conduct a scientific investigation to test a hypothesis **(I&E 9.a)** ***LABS / DEMOS / ACTIVITIES:*** • Focus on PS, Data Lab, "Ionic Radii and Lattice Energies", p 239 • Focus on PS, Lab, "Growing Crystals", pp 240-1 Note: Students should observe crystals under the microscope or polarized material if possible. • **Bond Blob** Combine saturated solution of sodium borate (Borax) with polyvinyl acetate (white glue) to form a Silly Putty-like polymer: crosslinked polyvinyl acetate.	4 Days

Structure of Matter (cont'd) *15% CST*

3. Each of the more than 100 elements have distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… that 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; and in gases the atoms and molecules are free to move independently, colliding frequently. **(3,e)** [CST] **DISTRICT ASSESSMENTS:** CR: Change of State **MODIFIED ASSESSMENTS:** Small groups create skits to demonstrate how motion of atoms increases when changing from a solid to a liquid to a gas. As each state of matter is being dramatized a narrator explains the change in the atoms or molecules movement.	*(Note: This standard provides the particle level description of states of matter that helps to explain the phase changes described in standard 3d.)* • Describe how the atoms or molecules of a solid vibrate, but do not move around, and will form a pattern that is a balance between forces that cause the atoms and molecules to repel and be attracted to each other. • Describe how the atoms or molecules of a liquid can slide past one another allowing it to flow without changing the density of the substance very much meaning that the molecules are as close to each other in a liquid as they are in a solid. • Describe how the atoms or molecules of a gas move about feely and collide randomly with each other and the walls of the container allowing the density of gas to be much lower than that of a liquid or solid meaning that the molecules are further apart.	**Focus on PS, 6:1** *PH FoPS, 6:3 and 15:1*	***KEY VOCABULARY:*** density **liquid** **state of matter gas** **solid plasma** ***GRAPHIC ORGANIZERS:*** Triple Venn Diagram or Double Bubble Map: solid vs. liquid vs. gas Reciprocal Teaching Reading Strategy using Focus on PS. Students chart *Predicting, Clarifying, Questioning, and Summarizing.* Construct large KWL chart in groups of 3-4 Flow Map of "Disappearing Ice Cube" lab ***SKILLS FOCUS:*** Modeling, experimentation Distinguish between linear and nonlinear relationships on a graph of data. **(I&E 9.g)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Launch Lab, "Model for Particle Movement", p 251 • Focus on PS, Mini Lab, "Observing Fluid Motion", p 255 • **GEMS**: Dry Ice Investigations, Activity 1, Session 3 models particle motion in solid, liquid, and gas without using actual dry ice. (Details re. dry ice storage and safety are included for the other activities.) • Focus on PS, Presentation Disc, Ch 6, "CA Sci8 CIM_States_of_M #110.avi", Animation: particle motion in plasma, gas, liquid, solid	4 Days

Structure of Matter (cont'd)

15% CST

3. Each of the more than 100 elements have distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… the states of matter (solid, liquid, gas) depend on molecular motion. **(3,d)** [CST] **DISTRICT ASSESSMENTS:** CR: Change of State **MODIFIED ASSESSMENTS:** Small groups create skits, graphics or demonstrations to make 2 new vocabulary terms come alive in a presentation to class. They need to include how the motion of the atom relates to their vocabulary terms. The assigned new terms are: Grp 1 – temperature and thermometer Grp 2 – melting and freezing Grp 3 – sublimation and condensation Grp 4 – evaporation and boiling	• Explain how all molecules are in constant motion. • Describe how the freedom of motion increases as a substance goes from solid to liquid to gas. • Define temperature as the average energy of motion of the atoms and molecules of a substance, which is what a thermometer measures. • Identify melting, vaporization, sublimation, condensation, and freezing as changes of state and evaporation and boiling as two types of vaporization. • Recall the temperatures at which water experiences phase changes (at normal pressure). • Explain that some substances have very specific melting and boiling points (listed in chemistry handbooks), which can be used to identify them. • Explain that some substances have more than one stable solid phase, such as diamond, which can exist as graphite or diamond. • Explain how a gain or loss in energy or changes in pressure contribute to changes in state and describe how the molecular motion of a substance changes as pressure and/or energy changes. *(Note: Standard 3e describes the states of matter at the atomic level. Standard 5d addresses the fact that phase changes are a physical process in contrast to a chemical process.)*	**Focus on PS, 6:2** *PH FoPS, 6:3, 15:1, 15:2, and 15:4*	***KEY VOCABULARY:*** pressure, **sublimation**, **energy of motion**, **condensation**, thermometer, **freezing**, change of state, **evaporation**, **melting**, **boiling**, **vaporization**, **melting or freezing point**, **boiling or condensation point** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: temperature vs. thermometer Circle Map: condensation Continue with Cornell Notes ***SKILLS FOCUS:*** Experimentation, graphing, observation Distinguish between variable and controlled parameters in a test. **(I&E 9.c)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Mini Lab, "Sensing Evaporation," p. 268 • Focus on PS, Data Lab, "Boiling Point and Pressure," p. 274 • Focus on PS, Lab, "Change of State … Liquids," p.276-7 • Focus on PS, Ch 6 Fast File: "Water Desalinization", p. 18 • Focus on PS, Super DVD Video Lab CH 6, "Testing Viscosity of Common Liquids" • LHS GEMS, Dry Ice Investigations	5 Days

Structure of Matter (cont'd) *15% CST*

3. Each of the more than 100 elements have distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… how to use the periodic table to identify elements in simple compounds. **(3,f)** [CST] **DISTRICT ASSESSMENTS:** CR: What's the Matter? **MODIFIED ASSESSMENTS:** Small groups build assigned vertical columns of the periodic table with colored, pre-cut, and uniformed sized squares of construction paper. On the colored square they include the name and symbol of the element, atomic #, and atomic weight. All of the completed squares are organized to build a class periodic table. In groups of four, categorize a list of atoms by placing them in their proper groups and periods. Then list the characteristic properties of each group. Numbered Heads Together: Ask questions where teams of 4 students must quickly locate atomic numbers, weights, or symbols of elements from the periodic table.	*(Note: This standard is just a reintroduction to the periodic table – it was first introduced in 3rd and 5th grades – so avoid getting too specific here. Standard set 7 will address more specific details of the organization and information found in the periodic table.)* • Identify elements found in common, simple compounds. • Identify the atomic number as the number of protons in the nucleus of an atom. • Explain that the periodic table is organized in order of increasing atomic number from left to right and top to bottom • Explain that the periodic table is organized into vertical columns that contain elements with similar properties. • Identify the chemical symbol, atomic weight, and atomic number of an element from the periodic table. • Explain that different periodic tables exist with different information to suit the needs to different areas of science.	**Focus on PS, 7:1** *PH FoPS, 16:1 and 18:2*	***KEY VOCABULARY:*** **periodic table** **atomic number** **atomic weight** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: atomic # vs. atomic weight Circle Map: periodic table Bridge Map or analogy: periodic table is to a calendar as a _____is to a _____. ***SKILLS FOCUS:*** Analyzing Construct appropriate graphs from data and develop quantitative statements about the relationship between variables. **(I&E 9.e)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Mini Lab, "Can You Guess the Element?" p. 300 • **Periodic Table Comparisons** Students should be given the opportunity to use the periodic table for reference and to compare the information on different periodic table such as one use for physicist vs. one used for chemists. CA Sci. Framework, p 137	2 Days

Periodic Table

12% CST

7. The organization of the Periodic Table is based on the properties of the elements and reflects the structure of atoms.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… how to identify regions corresponding to metals, nonmetals and inert gases. **(7,a)** [CST] **DISTRICT ASSESSMENTS:** CR: Biography of an Atom **MODIFIED ASSESSMENTS:** In small groups have students respond to questions on the periodic table using white boards, such as which elements are named after: planets famous scientists states and countries. In partners, students take turns finding and pointing to a specific area of the periodic table as directed by the teacher (metals, gases, noble gases, semimetals), while the other partner describes the characteristics of the elements in that specific area.	• Review the structure of the periodic table according to properties of the elements. o Identify the location of metals on the left side of the periodic table, with most reactive metals on the far left. o Identify the location of nonmetals on the right of the periodic table, with the most reactive nonmetals next to the inert gases on the far right. • Explain that scientists use the term "noble gas" instead of inert gas, because these elements can be made to react to form compounds under special laboratory conditions. • Identify the semimetals as elements with properties typical of both metals and nonmetals making them essential as semiconductors in computer chips. • Identify elements that have been named after famous scientists or the locations of laboratories that discovered the elements.	**Focus on PS, 7:1** *PH FoPS, Ch 16:1,2,3* **Focus on PS, 7:2** (p 309)	***KEY VOCABULARY:*** **inert** **noble gas** **metal** **reactive** **nonmetal** property **semimetal** **semiconductor** ***GRAPHIC ORGANIZERS:*** Triple Venn Diagram or Triple Bubble Map: metal vs. nonmetal vs. semimetal Circle Map: noble gas ***SKILLS FOCUS:*** analyze, justify ***LABS / DEMOS / VISUALS:*** • **Material Brainstorming** Students brainstorm a list of objects that are commonly made of metal. For each type of object, challenge students to think of other materials the objects could be made of. Then have students describe the properties that allow the materials to be used for each purpose. • Focus on PS, Presentation Disc Ch 7: "CA Sci8 Cim_Periodic_Table.avi", Animation: properties of transition metals • Focus on PS, Lab Manual, "Relationships Among Elements", p. 43-4	4 Days

Periodic Table (cont'd)

12% CST

7. The organization of the Periodic Table is based on the properties of the elements and reflects the structure of atoms.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… each element has a specific number of protons in the nucleus (the atomic number) and each isotope of the element has a different but specific number of neutrons in the nucleus. **(7,b)** [CST] **DISTRICT ASSESSMENTS:** CR: Biography of an Atom **MODIFIED ASSESSMENTS:** Partners using a periodic table explore some of the differences in the elements from the information on the table. First they look at the masses of the elements moving from left to right on the table then they look at the masses looking from top to bottom. After they discuss their findings they are each to record their new understanding of the differences observed on post-its and place them on a chart at the front of the room. Teacher shares and discusses these understandings with the class.	• Explain that the number of protons in the nucleus (the atomic number) of an atom identifies element. o Explain that atoms with different atomic numbers are different elements. o Explain that even though the number of protons is fixed for a given element, the number of neutrons may vary, forming isotopes of the element. • Identify the isotopes of hydrogen: the most common isotope, protium, has one proton; deuterium has one proton and one neutron; tritium has one proton and two neutrons. • Describe how some isotopes are radioactive, meaning that the nucleus is unstable and can spontaneously emit particles or trap an electron to become a new element with a different atomic number. (i.e., element 43, technetium, element 86, radon, and element 92, uranium, have no stable isotopes.) • Explain that the masses of elements' atoms in the periodic table increase from left to right, and from top to bottom.	**Focus on PS, 4:3 and 7:2** *PH FoPS, Ch 16:1*	***KEY VOCABULARY:*** **atomic number** massive proton **stable** nucleus emit **isotope** **spontaneous** **radioactive** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: element vs. isotope Circle Map: isotope ***SKILLS FOCUS:*** organize, classify ***LABS / DEMOS / VISUALS:*** • **"Isotope Race"** Student groups make poster-sized game board with outline of nucleus and four energy levels. Students use 3 types of pieces (coins, dried beans, poker chips, etc.) to represent protons, neutrons, and electrons. Teacher names an isotope (i.e., carbon-14) and teams race to build model correctly. • Focus on PS, Data Lab, "Visual Explanation of Half-Life", p. 312 • Focus on PS, Presentation Disc Ch 4, "CA Sci8 CIM_Atom_makeup.avi" Animation: structure of nucleus • Focus on PS, Super DVD Ch 4 Video Lab "Atomic Structure" • Focus on PS, Lab Manual, "Isotopes and Atomic Mass", p. 95-6	3 Days

Periodic Table (cont'd)

12% CST

7. The organization of the Periodic Table is based on the properties of the elements and reflects the structure of atoms.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity. **(7,c)** [CST] **DISTRICT ASSESSMENTS:** CR: Biography of an Atom PT: Density Rocks! **MODIFIED ASSESSMENTS:** Partners select a metal from groups 1-13, then describe themselves as if they were that metal, including their position in the periodic table, their properties (density, electrical and thermal conductivity, and how they are used, Small groups create a "Chemical Family Album". The album illustrates at least one characteristic of three chemical families and one characteristic of each element in these families.	• Recall that the physical properties of substances reflect their chemical composition and atomic structure. • Explain that the melting temperature or hardness of elements is related to the forces that hold atoms and molecules together. • Explain that even slight atomic differences can cause dramatically different properties (i.e., carbon is a solid, even at very high temperatures, while nitrogen, the very next element, is a gas, even at extremely low temperatures). • Define density as the mass per unit volume. • Explain that density is the result of both the masses of individual atoms and the closeness with which atoms are packed. • Explain that electrical and thermal conductivity are depend on how tightly electrons are held to individual atoms. • Explain that metal atoms arrange in regular patterns in which some electrons are free to move from atom to atom, making both electrical and thermal conductivity easy.	**Focus on PS, Ch 7:1,3** *PH FoPS, Ch 16:1,2,3*	***KEY VOCABULARY:*** intermolecular force density thermal conductivity ***GRAPHIC ORGANIZERS*** Circle Maps: density and thermal conductivity ***SKILLS FOCUS:*** identify cause/effect ***LABS / DEMOS / ACTIVITIES:*** • Focus on PS, Mini Lab, "Which Parachute", p. 319 • Focus on PS, Lab, "Investigating Physical Changes", p. 320-1 • Focus on PS, Lab Manual, "Identifying Metals and Nonmetals", p. 93-4	3 Days

Reactions

12% CST

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… physical processes include freezing and boiling, in which a material changes form with no chemical reaction. **(5,d)** [CST] **DISTRICT ASSESSMENTS:** CR: What's Cooking? CR: Change of State **MODIFIED ASSESSMENTS:** Partners research two examples of chemical change and two examples of physical change and demonstrate to class. Small groups take a list of examples of changes and classify them as physical or chemical and explain why to the class or to other small groups. In small groups, students perform various teacher-provided activities in which substances are mixed and change takes place. Group members decide if each change is physical or chemical and explain why.	• Identify physical and chemical properties. • Identify physical changes as changes that do not change the identity of a substance. • Identify and describe examples of physical changes including changes of state such as freezing and boiling. • Demonstrate how physical changes can be reversed. *(See last activity listed in right column.)* • Compare and contrast physical and chemical changes. *(Note: Standard 7c applies analysis of physical properties in the context of relationships of elements in the periodic table.)*	**Focus on PS,** **Ch 7:3 (physical)** **Ch 8:1 (chemical)** *PH FoPS, Ch 15:4 and 17:1*	***KEY VOCABULARY:*** **physical change** physical property chemical property ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: physical change vs. chemical change and physical property vs. chemical property ***SKILLS FOCUS:*** Experiment Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Mini Lab, "Chemical / Physical Change", p. 345 • **Reversing Physical Changes** Students mix iron fillings with sand and recover the iron using a magnet to demonstrate that no chemical change occurred. CA Science Framework, p. 142	3 Days

End District Quarter 1 Exam Material

Reactions

12% CST

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… reactant atoms and molecules interact to form products with different chemical properties. **(5,a)** [CST] **DISTRICT ASSESSMENTS:** CR: What's Cooking? **MODIFIED ASSESSMENTS:** In small lab groups have students identify each chemical in a test tube that will be part of a chemical reaction (vinegar & baking soda) and on a data table record the physical properties of each reactant. Pour the vinegar into the baking soda and record the observations including a description of the product. Compare and contrast the properties of the reactants and the product. Have students write the formulas for the reactants identifying the elements and compounds then write out the formula for the product. Students record the reactants in one color and the product in another color. Students explain what happened in this chemical reaction.	• Explain how when atoms and molecules react, products are made with different chemical properties and often different physical properties. • Perform and explain simple chemical reactions, identifying the elements and compounds involved in those reactions. • Compare and contrast the differences in properties between the reactants and products of a chemical reaction. *(Note: This standard extends the content of standard 3b.)*	**Focus on PS, Ch 8:1** *PH FoPS, Ch 17:1 and 17:2*	***KEY VOCABULARY:*** **chemical reaction** atom **product** molecule **physical property** **reactant** **chemical property** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: physical properties vs. chemical properties and atom vs. molecule Flow Map: reactants to product(s). Circle Map: chemical reaction ***SKILLS FOCUS:*** Experimentation Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Design Your Own Lab, "Dirty Jewelry" p. 366-7 • Focus on PS, Launch Lab, "Can You See… ?", p. 335 • Focus on PS, Mini Lab, "Chemical / Physical Change", p. 345 • LHS GEMS, Chemical Reactions	3 Days

Reactions (cont'd)

12% CST

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… 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. **(5,b)** [CST] **DISTRICT ASSESSMENTS:** CR: Sweet! **MODIFIED ASSESSMENTS:** Partners balance teacher generated equations, then check their answers with other partners. Next, each set of partners selects an equation to put on a poster or overhead to present to class or the poster can be presented as a 'Stay and Stray'.	• Explain the concept of conservation of matter, which states that matter cannot be created or destroyed in a chemical reaction; the atoms are only rearranged. • Prove the law of conservation of matter through a lab or demonstration or by modeling the chemical reaction. • Balance simple chemical equations, referencing the law of conservation of matter when explaining how the equation balances.	**Focus on PS, Ch 8:2** *PH FoPS, Ch 17:2*	***KEY VOCABULARY:*** **conservation** of matter **system** **balanced** chemical equation ***GRAPHIC ORGANIZERS:*** Venn diagram or Double Bubble Map: coefficients vs. subscripts Circle Map: conservation of matter Flow Map: steps for balancing an equation ***SKILLS FOCUS:*** Experimentation, evaluation Evaluate the accuracy and reproducibility of data. **(I&E 9.b)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Data Lab, "Where does the tablet go?" p. 348 • Focus on PS, Mini Lab, "Burning of Methane", p. 357 • Focus on PS, Super DVD, Ch 8 Video Lab, "Designing a Team Equation" • Focus on PS, Lab Manual, "Conservation of Mass," p. 47-9 • **"Modeling the Carbon Cycle"** Use molecular model kit to construct 1 glucose and 6 oxygen molecules. Rearrange to form carbon dioxide and water molecules. Write the balanced equation. *Note: Gumdrops and tooth picks may also work and various reactions should be modeled in this activity.*	4 Days

Reactions (cont'd) *12% CST*

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… chemical reactions usually liberate heat or absorb heat. **(5,c)** [CST] **DISTRICT ASSESSMENTS:** CR: 4th of July Pancake Breakfast **MODIFIED ASSESSMENTS:** In small lab groups, perform chemical change labs and identify which chemical reactions are endothermic and which are exothermic (e.g., Alka-Seltzer in water is endo-, yeast in peroxide is exo-, metal in acid is exo-). Students record their responses on a data table. Partners present a poster, demonstration, dramatization or practical examples of exo- and endo- reactions. Small lab groups design an experiment to decide if a "chemical reaction" takes place as the iron in steel wool rusts.	• Identify chemical bonds as the energy that holds atoms together to form molecules. • Explain that chemical bonds are made and broken during chemical reactions resulting in a release and/or absorption or energy. • Define exothermic reactions as reactions where more energy is released than absorbed. • Explain why exothermic reactions feel warm or even hot. • Define endothermic reactions as reactions where more energy is absorbed than released. • Explain why endothermic reactions feel cool or even cold. • Compare and contrast specific examples of exothermic and endothermic reactions. • Explain why evaporation is not an endothermic chemical reaction even though the process absorbs heat (feels cool).	**Focus on PS, Ch 8:3** *PH FoPS, Ch 14:3, 17:1, and 17:3*	***KEY VOCABULARY:*** chemical bond **exothermic** release **endothermic** absorption ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: release vs. absorption and exothermic reactions vs. endothermic reactions Circle Map: chemical bonds Tree Map: chemical bonds ***SKILLS FOCUS:*** Graphing, experimentation Construct appropriate graphs from data and develop quantitative statements about the relationship between the variables. **(I&E 9.b)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Data Lab, "Temperature Change as Chemicals React", p. 364 • Activity: Demonstrate hot packs and cold packs used for athletic injuries that use chemical reactions to change temperature. • LHS GEMS, Chemical Reactions – very good exothermic reaction	3 Days

Reactions (cont'd)

12% CST

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… how to determine whether a solution is acidic, basic or neutral. **(5,e)** [CST] **DISTRICT ASSESSMENTS:** PT: Acid or Base? **MODIFIED ASSESSMENTS:** In small lab groups have students use cabbage juice to test various solutions in class. Classify the substances and chart the results. Students make a two- tab book to compare and contrast acids and bases. Make a hamburger fold of notebook paper and cut the top in the center from the edge to the fold line. Flap 1 write Acid in the center and Flap 2 write Base. At the bottom of Flap 1 write the numbers 1-7 and on Flap 2 write out 8-14, which correspond to the pH scale. On the inside have students record their information on each and give examples of each. In small lab groups students demonstrate which of 4 solutions is best at cleaning pennies and whether the pH of a solution is related to its cleaning abilities. Students make a 3-column chart by folding notebook paper with 2 folds. Label columns: Acid, Base or Neutral. List examples that are used in class, ones that have been found at home and ones researched. Practical Research: "How to treat insect bites that are acidic and those that are basic". Zike, Teaching Science with Foldables.	• Describe the distinctive properties of acids, bases, and neutral substances. • Explain how the pH scale uses the concentration of hydrogen ions (H^+) in solution to classify substances as acidic, neutral, or basic. • Explain how the pH scale to identifies substances as acids, bases, or neutral. • Explain how indicators are used to identify substances as acids or bases. • Use indicator solutions, pH paper, pH meters, and/or litmus paper to identify substances as acids, bases, or neutral. • Compare and contrast acids and bases.	**Focus on PS, Ch 9:2** (9:1 provides background on solutions and introduces key vocabulary.) *PH FoPS, Ch 19:2,3*	***KEY VOCABULARY:*** acid, base, neutral, concentration, hydrogen ion, pH scale, indicator, litmus paper, pH meter, pH paper ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: acid vs. base Circle Map: pH scale ***SKILLS FOCUS:*** Experimentation, comparison Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • **Comparing Indicators** Determine the color ranges of various indicators (phenol red, bromthymol blue, universal indicator, phenolphthalein, etc.) by testing with adic, base, and neutral solutions. • LHS GEMS, Of Cabbages and Chemistry • Focus on PS, Mini Lab, "Determine pH", p. 406 • Focus on PS, Design Your Own Lab, "Solubility and pH", p. 408-9 • Focus on PS, Pres. Disc Ch 9, "CA Sci8 CIM_Acid_Reactions.avi", video of chemical reactions involving acids "CA Sci8 CIM_Polar_Moles.avi", animation: how water molecules affect NaCl • Focus on PS, Super DVD Ch 9 Video Lab, "Testing pH Using Natural Indicators" • LHS GEMS, Acid Rain	3 Days

Chemistry of Living Systems (Life Science) *5% CST*

6. Principles of chemistry underlie the functioning of biological systems.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… 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. **(6,a)** [CST] **DISTRICT ASSESSMENTS:** CR: Sweet! **MODIFIED ASSESSMENTS:** Small groups must create, describe and identify models of 3 different carbon molecules. The shapes that need to be created are: linear planar tetrahedral These shapes and descriptions, along with examples of their corresponding molecules and formulas will be presented to class with an explanation of how the shapes of the molecules influence their chemical properties.	• Describe how carbon is unique in that it easily bonds to itself and to many other elements to form a great variety of large molecules. • Explain that a carbon atom will make four separate covalent bonds, which can be single, double, or triple. • Explain that there are a variety of shapes for carbon based molecules: o Describe and identify **linear** carbon molecules, like acetylene and carbon dioxide. o Describe and identify **planar** carbon molecules, like formaldehyde, ethylene, and graphite. o Describe and identify **tetrahedral** carbon molecules, like methane and carbon tetrachloride. • Explain that the shapes of molecules have a great influence on chemical properties.	**Focus on PS, Ch 10:2** *PH FoPS, Ch 21:1-3*	***KEY VOCABULARY:*** combine molecule **covalent** properties ***GRAPHIC ORGANIZERS:*** TripleVenn Diagram or Triple Bubble Map: linear vs. planar vs. tetrahedral, with examples and drawings Circle Map: covalent bonds Bubble Map: Carbon ***SKILLS FOCUS:*** describe, model ***LABS / DEMOS / VISUALS:*** • Construct models of carbon based molecules by using commercial modeling kits, or try gumdrops or marshmallows and toothpicks • Focus on PS, Mini Lab, "Modeling Organic Compounds", p. 434 • Focus on PS, Launch Lab, "Life Chemical", p. 419 • **Hydrocarbon Challenge** Given molecular models (or gumdrops and toothpicks) students create models of hydrocarbons and record molecular and structural formulas.	3 Days
… living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur. **(6,b)** [CST, LS10] **DISTRICT ASSESSMENTS:** CR: Sweet! PT: What's in your Food? **MODIFIED ASSESSMENTS:** ***For 6b & 6c:*** Students create a colorful foldable on the 6 common elements that make up the most molecules in living organisms. Start with a hotdog fold of notebook paper and list the six elements on the front. Open the paper and on the left list as many molecules found in living organisms that are made from these six elements. On the right side, explain and describe the molecules and what they do for the organism.	• Explain that living organisms are made up of many atoms, but that carbon and only five other elements make up most of Earth's biomass. • Describe how the six common elements combine in a great variety of ways to produce everything from proteins to DNA, and from fats to bone.	**Focus on PS, Ch 10:1** *PH FoPS, Ch 21:1-3*	***KEY VOCABULARY:*** biomass compound organic ***GRAPHIC ORGANIZERS:*** Circle Map: organic ***SKILLS FOCUS:*** observe, experiment Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • **Organic Composition Demonstration** Teacher may burn organic material such as bone, wood, or candles. Hold glass or plate above a flame to condense droplets of water, one of the combustion products. Teacher can hold a heat-treated glass beaker or test tube in flames to collect carbon deposits in the form of soot. Have students compare this to the burnt edges of a hamburger or piece of toast. CA Science Framework, p. 144 • Focus on PS, Mini Lab, "Water in Celery", p. 425 • Focus on PS, Lab Manual, "Proteins: Chemistry and Identification", p. 69-72	1 Day

Chemistry of Living Systems (Life Science) (cont'd) *5% CST*

6. Principles of chemistry underlie the functioning of biological systems.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… 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. **(6,c)** [CST, LS10] **DISTRICT ASSESSMENTS:** PT: What's in your Food? **MODIFIED ASSESSMENTS:** ***(See 6b)***	• Explain that living organisms require a variety of molecules, some that contain carbon and some that do not. • Explain that the molecules that make up organisms and control biochemical reactions are usually large, like DNA, proteins, carbohydrates and fats. • Explain how organisms also require simple substances such as water and salt to support their functioning.	**Focus on PS, 10:1,3** *PH FoPS, 21:3*	***KEY VOCABULARY:*** **carbohydrates** **fats** **proteins** **DNA** **biochemistry** reactions function ***GRAPHIC ORGANIZERS:*** Circle Map: biochemistry ***SKILLS FOCUS:*** analyze ***LABS / DEMOS / VISUALS:*** • Focus on PS, Lab, "Polarity and Living Systems", p. 444-5 • **Exploring Simple Compound Content** Squeeze water from celery or turnips to demonstrate its presence. Follow up by asking how to show the presence of water in fruits and vegetables, or how they know that there is salt in their bodies (perspiration). CA Science Framework, p. 144	2 Days

Motion *13% CST*

1. The velocity of an object is the rate of change of its position.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… position is defined in relation to some choice of standard reference point and a set of reference directions. **(1,a)** [CST] **DISTRICT ASSESSMENTS:** PT: Marshmallow Catapult **MODIFIED ASSESSMENTS:** In small groups students take turns to demo to each other a standard reference point, then describe the position of a person or object in relation to the reference point by using a reference direction such as, away from, behind, in front of, left, right, or north, south, east, west. Individual students illustrate the position of a person or object in relation to a standard reference point with labels. Then write a description of the position of the person or object using reference directions.	• Describe the position of a person or object in relation to a standard reference point, this point is usually called the origin. • Describe the position of a person or object using reference directions, such as in front of, in back of, to the side of, etc.	**Focus on PS, Ch 1:1** *PH FoPS, Ch.1:1*	***KEY VOCABULARY:*** **reference point** ***GRAPHIC ORGANIZERS:*** Circle Map: reference point Large KWL charts in groups of 3-4 ***SKILLS FOCUS:*** observe, graph, measure Plan and conduct a scientific investigation to test a hypothesis. [CST] **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Launch Lab, "Get From Here to There", p. 45 • Focus on PS, Data Lab, "Graph Relative Positions", p 55 • Focus on PS, Mini Lab, "Negative Positions", p 49	1 Day

Motion (cont'd)

13% CST

1. The velocity of an object is the rate of change of its position.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary. **(1,b)** [CST] **DISTRICT ASSESSMENTS:** CR: A Snail's Tail CR: Of Parachutes and Apples **MODIFIED ASSESSMENTS:** Students make study cards (Flash Cards) of the formulas used in the Motion Unit. The first card is: **speed = distance/time** One side of the card is the formula and the opposite side explains the formula and gives an example. Students will use these throughout the unit to self- test and to test their partners. Partners calculate speed using the ISU metric system to measure distances in m (meters) and time in s (seconds). They complete several teacher created problems before making up 3 of their own.	• Calculate speed. • Apply the modernized version of the metric system (International Systems of Units) to measure distance and time. • Compare and contrast the calculations for speed and average speed. • Create and perform experiments to study speed (as described at the bottom of the list of LABS / DEMOS / ACTIVITIES).	**Focus on PS, Ch 1:2** *PH FoPS, Ch. 1:1*	***KEY VOCABULARY:*** **speed distance** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: speed vs. average speed Circle Map: distance Continue w/ Cornell Notes ***SKILLS FOCUS:*** predict, observe, apply, measure, record Plan and conduct a scientific investigation to test a hypothesis **(I&E 9.a)** Evaluate the accuracy and reproducibility of data. **(I&E 9.b)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Mini Lab, "Measure Average Speed", p. 63 • Focus on PS, Presentation Disc, Ch 1, CA Sci 8 nCIM_Distance_vs #11D.avi", Animation: Graphing Distance vs. Time • **Average Speed Investigations** Students create experiments where time and distance are measured to determine average speed, results are compared among students, and accuracy is evaluated. CA Science Framework, p. 126-7	3 Days

Motion (cont'd)

13% CST

1. The velocity of an object is the rate of change of its position.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… how to solve problems involving distance, time, and average speed. **(1,c)** [CST] **DISTRICT ASSESSMENTS:** CR: A Snail's Tail CR: Full Throttle **MODIFIED ASSESSMENTS:** Students add to their formula cards the 3 following math formulas: **d = rt t = d/r r = d/t** One side of the card states the formula while the opposite side explains the formula and gives an example. These formulas can be used with examples that match but written on an additional card for a "Mix Freeze Match" activity. Partners practice several teacher-generated problems that implement all 3 formulas. Then each partner generates one and shares. Students self-test their knowledge and understanding of the formulas using their study cards. They, also, quiz their partners.	• Apply the d=rt formula to solve problems involving distance, time and average speed. • Demonstrate how, given any two quantities from the d=rt formula, the third quantity can be calculated: t=d/r and r=d/t. ∗ *Explain how real, measurable variables affect one another when they are connected by an equation. (LBUSD)*	**Focus on PS, Ch 1:2** *PH FoPS, Ch.1:1*	***KEY VOCABULARY:*** distance time **rate** ***GRAPHIC ORGANIZERS:*** Circle Map: rate ***SKILLS FOCUS:*** apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms. **(I&E 9.f)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Applying Math, p. 62 • **Average Speed Variations Investigation** Students create and perform a series of experiments to investigate the effect on average speed when one condition at a time is changed.	2 Days

Motion (cont'd)

13% CST

1. The velocity of an object is the rate of change of its position.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… the velocity of an object must be described by specifying both the direction and the speed of an object. **(1,d)** [CST] **DISTRICT ASSESSMENTS:** CR: A Snail's Tail CR: Of Parachutes and Apples CR: Accelerated Thinking **MODIFIED ASSESSMENTS:** Students make a vocabulary study sheet for self-testing and partner testing. Make a hotdog fold and on the front, vertically list the following vocabulary words: displacement, velocity, acceleration, and force. On the inside right record the definitions and any illustrations to help remember. Partners are given laminated cards that illustrate the movement of an object and they make arrows on the card to graphically indicate the direction and strength of the force. The arrows point in the direction that the force is being applied, and its length indicates magnitude.	• Define vector quantities as measurable quantities that require both the magnitude and direction. • Identify the vector quantities of displacement, velocity, acceleration, and force. • Contrast vector and non-vector quantities, such as displacement vs. distance and velocity vs. speed. • Describe and demonstrate how the direction and strength of a force may be indicated graphically by using an arrow.	**Focus on PS, Ch 1:1,2** *PH FoPS, Ch.1:1*	***KEY VOCABULARY:*** **velocity** **magnitude** accleration displacement **vector quantities** force ***GRAPHIC ORGANIZERS:*** Venn Diagram or double bubble: speed vs. velocity Circle Map: velocity ***SKILLS FOCUS:*** observe, apply, model ***LABS / DEMOS / VISUALS:*** • Model the meaning of velocity, specifying both speed and direction, by simulating the role of an air traffic controller. • Focus on PS, Ch 1 Fast File, "You've Been Displaced", p. 62	3 Days
… changes in velocity may be due to changes in speed, direction, or both. **(1,e)** [CST] **DISTRICT ASSESSMENTS:** CR: Accelerated Thinking **MODIFIED ASSESSMENTS:** Partners demo and define acceleration using toy cars and/or balls. Sets of partners present to the class. In small groups students define and demo velocity and present 3 ways to change the velocity of an object in motion. Groups present to each other and select the best ones to demo for class.	• Describe how either a change in speed or a change in direction can change velocity. • Define acceleration as any change in velocity: speeding up, slowing down, or changing direction. • Explain that any time you feel a force acting on you or "pull" (for instance, when driving in a car) an acceleration is occurring. • Demonstrate how to change velocity by changing the speed of an object's motion but not the direction. • Demonstrate how to change velocity by changing the direction of an object's motion but not the speed. • Demonstrate how to change velocity by changing both the speed and direction of an object's motion.	**Focus on PS, Ch 1:2** *PH FoPS, Ch.1:3*	***KEY VOCABULARY:*** **acceleration** ***GRAPHIC ORGANIZERS:*** Circle Map: acceleration ***SKILLS FOCUS:*** observe, model Plan and conduct a scientific investigation to test a hypothesis **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • Students design experiments to show the various ways to cause changes in velocity.	3 Days

Motion (cont'd)

13% CST

1. The velocity of an object is the rate of change of its position.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction. **(1,f)** [CST] **DISTRICT ASSESSMENTS:** CR: A Snail's Tale CR: Full Throttle **MODIFIED ASSESSMENTS:** Students add this fifth formula to their formula study cards (Flash Cards): **V = d/t = rise/run = slope** Partners calculate slope and explain their understanding to each other, using teacher generated problems. Pairs interpret motion graphs (generated by teacher) to the class, using their new vocabulary terms. Partners plot and interpret graphs of speed vs. time using the ISU and share with the class.	• Plot and interpret motion graphs by plotting position (d) in distance units (meters, centimeters, miles) on the vertical axis and time (t) in time units (seconds, minutes, hours) on the horizontal axis. • Explain that since speed can be calculated as v = d/t, with d being the amount of rise and t being the amount of run (as math teachers put it), then speed is equal to the slope of the graph. In symbols, **v** = d/t = rise/run = **slope** • Calculate the slope of a position versus time graph and identify the numerical answer as the speed in the units used on the axes. • Plot and interpret graphs of speed (v) versus time (t). • Calculate the area under a speed versus time graph and identify the numerical answer as the distance traveled by the object according to the equation: **d** = v x t = height x width = **slope**	**Focus on PS, Ch 1:3** *PH FoPS, Ch. 1:1 and 1:3*	***KEY VOCABULARY:*** **horizontal (or x) axis** **vertical (or y) axis** **slope** **area** ***GRAPHIC ORGANIZERS:*** Venn Diagram or double bubble: horizontal axis vs. vertical axis Circle Map: motion graph ***SKILLS FOCUS:*** graph, interpret, explain Review the direction of vertical, horizontal, diagonal. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables. **(I&E 9.e)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Data Lab, "Learning from a Graph", p 73 • Focus on PS, Design Your Own Lab, "Graphing Motion", pp 74-75	4 Days

End District Quarter 2 Exam Material

Forces

13% CST

2. Unbalanced forces cause changes in velocity.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)

… a force has both direction and magnitude. **(2,a)**
 	
[CST]
 	
DISTRICT ASSESSMENTS:
CR: Tug-of-War
 	
MODIFIED ASSESSMENTS:
Individuals create a vocabulary book for the new terms in the Forces Unit, making sure to include illustrations, examples and explanations.
The vocabulary book needs to contain illustrations and explanations of the use of the 'arrow' in explaining the direction and strength of a force. Show how the arrow is a graphic indicator of any vector quantity.
	• Model pushes and pulls, pointing out both the magnitude and direction of force.
	• Explain that the direction and strength of a force (as with any vector quantity) can be graphically indicated by using an arrow: *(Review from Standard 1d)*
	  ◦ Draw the length of the arrow to be proportional to the strength (magnitude) of the force.
	  ◦ Draw the direction of the arrow to indicate the direction that the force is applied.
	• Demonstrate that forces acting along a line, to the left and to the right, act either in a positive direction and are represented in positive quantities or in a negative direction and are represented as negative quantities.
	• Explain that friction is a reaction force that opposes motion.
		Focus on PS, Ch 2:1,2
		
		PH FoPS, Ch 2:1,3
			KEY VOCABULARY:
			force **direction**
			magnitude **friction**
			
			GRAPHIC ORGANIZERS:
			Venn diagram or double bubble: magnitude vs. direction
			
			Circle Map: Sir Isaac Newton
			
			Circle Map: friction
			
			Tree map of force, push, pull, magnitude, direction, friction, arrows
			
			Large KWL chart in groups of 3-4
			
			SKILLS FOCUS:
			observe, record, measure
			
			Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)**
			
			Evaluate the accuracy and reproducibility of data. **(I&E 9.b)**
			
			LABS / DEMOS / VISUALS:
			• **Friction Experiments**
			First, create lab activities that teach students how to use a spring scale to measure pulling forces. (Be careful that they do not continually pull the spring scale to and beyond its maximum reading.) Then, have students design lab activities to explore the forces of friction:
			- using different surfaces
			- using different amounts of applied forces
			- different speeds
			• Focus on PS, Data Lab, "Add Vertical Forces", p 95
			• Focus on PS, Mini Lab, "Measure Friction", p 105
				3 Days

… when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces. **(2,b)** [CST] **DISTRICT ASSESSMENTS:** CR: Tug-of-War **MODIFIED ASSESSMENTS:** Partners draw an example of two opposing forces acting on an object and illustrate one force overcoming the other. Then take a measurement of the distance the object moved from the point of origin. Give a value of positive to the distance if greater distance is pushed or negative value if greater distance was pulled.	• Demonstrate how to assign positive or negative values to force vectors acting in opposite directions along a straight line. • Use simple algebraic addition of the force magnitudes (positive force in one direction added to the negative force value pulling in the opposite direction) to determine the resulting unbalanced force. • Recall that a Newton of force is about equal to the weight of half a stick of butter or of a small apple.	**Focus on PS, 2:1** *PH FoPS, Ch 2:2*	***KEY VOCABULARY:*** **Newton (N)** **resulting force** ***GRAPHIC ORGANIZERS:*** Vector Diagrams ***SKILLS FOCUS:*** apply, observe, hypothesize Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms. **(I&E 9.f)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Science Concepts Activity, p 107 TE	2 Days

Forces (cont'd)

13% CST

2. Unbalanced forces cause changes in velocity.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)

… how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction. **(2,d)**
 	
[CST]
 	
DISTRICT ASSESSMENTS:
CR: Of Parachutes and Apples
 	
MODIFIED ASSESSMENTS:
Partners act out the meanings of the terms horizontal and vertical for each other.
 	
Partners create a demo and definition of 'balanced forces', explaining the types of forces acting on the object and why they are called 'balanced'. It should be pointed out that there is no change in velocity when the forces are balanced. These demos are presented to other partners.
	• Compare and contrast the weight of an object (how hard it pushes down on whatever is beneath it) to the mass of an object (how much material it is made of).
	• Explain that the force of gravity (what we commonly call the "weight" of an object) can be shown as a force vector pointing toward the center of the Earth (a.k.a., down).
	• Explain that when an object is dropped the force of gravity alone causes the velocity to increase rapidly in the down direction.
	• Explain that an object at rest must have an upward supporting force to balance the force of gravity.
	  o Explain that when an object is supported from below, like a book resting on a table, the supporting force is an elastic compression force caused by the compression of the table's molecules, which are resisting being pushed together.
	  o Explain that when an object is supported from above, like a yo-yo hanging on a string, the supporting force is an elastic tension force caused by the molecules resistance to being pulled apart.
	• Demonstrate the presence of friction force by showing that a gentle horizontal push on a book that rests on a table does not move it.
		Focus on PS, Ch 2:2
		
		PH FoPS, Ch 2:3 (does not mention compression force)
			KEY VOCABULARY:
			weight, gravity, force, **static**, **elastic**, **compression**, **tension**
			
			GRAPHIC ORGANIZERS:
			Venn Diagram or Double Bubble Map: horizontal vs. vertical
			
			Circle Map: balanced forces
			
			SKILLS FOCUS:
			identify, predict, draw conclusions
			
			Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)**
			
			Evaluate the accuracy and reproducibility of data. **(I&E 9.b)**
			
			Distinguish between variable and controlled parameters in a test. **(I&E 9.c)**
			
			LABS / DEMOS / VISUALS:
			• Focus on PS, Launch Lab, "Feel the Force", p 85
			• Focus on PS, Design Your Own Lab, "Comparing Mass and Weight", p 117
			• Focus on PS, Mini Lab, "Elastic Force", p 102
			• Focus on PS, Ch 2 Fast File, "Weight, Mass, and the Gold Rush", p 23
			• Focus on PS, Super DVD, Ch 2 Video Lab, "Static and Sliding Friction"
				5 Days

Forces (cont'd)

13% CST

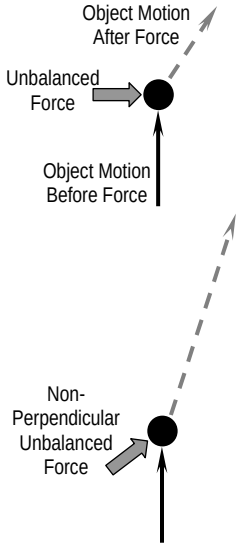
2. Unbalanced forces cause changes in velocity.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… when the forces on an object are balanced, the motion of the object does not change. **(2,c)** [CST] **DISTRICT ASSESSMENTS:** CR: Tug-of-War **MODIFIED ASSESSMENTS:** Partners act out the meanings of the terms horizontal and vertical for each other. Partners create a demo and definition of 'balanced forces', explaining the types of forces acting on the object and why they are called 'balanced'. It should be pointed out that there is no change in velocity when the forces are balanced. These demos are presented to other partners.	• Demonstrate that there is no change in the velocity of an object when it is acted upon by **balanced forces**. o Explain and diagram how a person sitting in a chair has balanced forces acting on them (gravity pulling down, chair/floor pushing up). o Demonstrate in a tug of war game that if there is equal force from both sides, the rope will not move. o Explain and diagram how a car driving down a straight road at constant speed has balanced forces acting on it (**Vertical Forces**: gravity pulling down, road pushing up, **Horizontal Forces**: drive wheels pushing forward, friction pulling backwards).	**Focus on PS, Ch 2:1** *PH FoPS, Ch 2:1*	***KEY VOCABULARY:*** **friction horizontal vertical** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: horizontal vs. vertical Circle Map: balanced forces ***SKILLS FOCUS:*** identify, predict, draw conclusions Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** Evaluate the accuracy and reproducibility of data. **(I&E 9.b)** Distinguish between variable and controlled parameters in a test. **(I&E 9.c)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Practice Skills, Recognize Cause and Effect, p 91 TE	3 Days

Forces (cont'd)

13% CST

2. Unbalanced forces cause changes in velocity.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction). **(2,e)** [CST] **DISTRICT ASSESSMENTS:** CR: Of Parachutes and Apples **MODIFIED ASSESSMENTS:** Partners demonstrate examples of balanced and unbalanced force on an object at rest, explaining why there is motion in the direction of the applied force. Partners demonstrate how an unbalanced force can act on an object in motion. Show how a force going in the same direction as the motion causes the object to speed up or how a force in the opposite direction slows the motion. Students share their demonstrate to the class.	• Explain and demonstrate how an unbalanced force acting on an object at rest causes the object to move in the direction of the applied force. *(For instance, when gently pushing horizontally on a book resting on a table, the forces are balanced – pushing and friction – until the point where the book begins to move, at which point the pushing force is no longer balanced by the friction.)* • Explain and give an example of how, for an object in motion, an unbalanced force acting in the same direction of the motion will cause the object to speed up. • Explain and give an example of how, for an object in motion, an unbalanced force acting in the opposite direction of the motion will cause the object to slow down; and if the force continues the object may slow to a stop or even begin to move faster in the opposite direction. *(A useful image: Picture a train running down a track. If the engineer suddenly throws the drive wheels into reverse, those wheels will spin backwards while the train continues forward, but the train will begin to slow down. Eventually the train would come to a stop and begin picking up speed going backwards. Rockets drifting through space can also be used as examples.)* • Explain how when an unbalanced force that acts perpendicular to direction to a moving object (it gets smacked from the side), the force will deflect it from its path, changing its direction but not its speed. • Explain that if the perpendicular force is continuous, the object will travel in a circle (caused by centripetal force: the force directed to the center of the circle). • Explain why an unbalanced force acting on a moving object at a non-perpendicular angle to the path will affect both the speed and the direction of the object. • Predict (roughly) the changes in velocity if forces are shown to be acting on an object.	**Focus on PS**, **Ch 2:3** *PH FoPS, Ch 2:1,5*  	***KEY VOCABULARY:*** **unbalanced forces** **perpendicular** **centripetal force** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: balanced forces vs. unbalanced forces ***SKILLS FOCUS:*** identify, predict Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • Focus on PS: Mini Lab, "Does Water Exert a Force?", p 110 • **Marble Roller Coasters** Use sections of foam pipe insulation (cut in half length-wise) and masking tape to create a track for a marble. Have students identify and describe the different types of acceleration that the marble experiences, and the forces responsible for each.	6 Days

Forces (cont'd)

13% CST

2. Unbalanced forces cause changes in velocity.

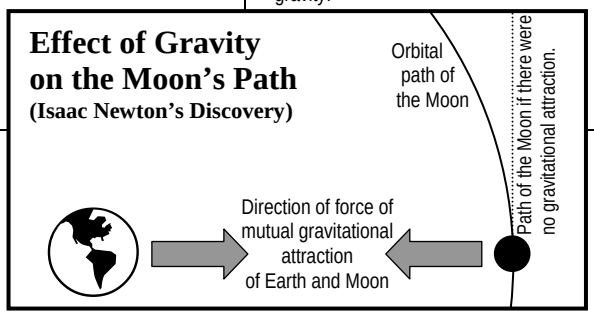
Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… the greater the mass of an object, the more force is needed to achieve the same rate of change in motion. **(2,f)** [CST] **DISTRICT ASSESSMENTS:** CR: Tug-of-War **MODIFIED ASSESSMENTS:** Small groups create posters of terms used in the Forces Unit for a "Stay and Stray". Each group is assigned one term from the following list: Balanced forces Unbalanced forces Acceleration Deceleration These posters need to include definitions and drawings or pictures that demonstrate a change in velocity.	• Recall that when the forces acting on an object are unbalanced, the velocity of the object must change by increasing, decreasing, or changing direction. • Define acceleration as the rate of change in velocity. • Identify cases of acceleration (speeding up, slowing down, or changing direction) from descriptions, demonstrations, or video clips. • Determine the direction and relative magnitude of the unbalanced force causing an observed acceleration (or deceleration). • Explain how both amount of mass and magnitude of force affect acceleration (how quickly velocity changes). o Give examples and demonstrate how the larger the unbalanced force applied, the faster the velocity of an object will change. o Give examples and demonstrate how the greater the mass, the slower the velocity of an object will change.	**Focus on PS, Ch 2:3** *PH FoPS, Ch 2:2*	***KEY VOCABULARY:*** **acceleration deceleration** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: acceleration vs. deceleration Circle Map: forces ***SKILLS FOCUS:*** estimate, calculate, analyze Distinguish between variable and controlled parameters in a test. **(I&E 9.c)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Solve for Acceleration, p 109 • Focus on PS, Identifying Misconceptions, p 109 TE • Focus on PS, Applying Math, "Force and Acceleration", p 115 • Focus on PS, Ch 2 Fast File, "Off to the Races", p 24 • Focus on PS, Super DVD, Ch 1, Video Lab, "Force and Acceleration"	5 Days

Forces (cont'd)

13% CST

2. Unbalanced forces cause changes in velocity.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… the role of gravity in forming and maintaining the shapes of planets, stars and the solar system. **(2,g)** [CST] **DISTRICT ASSESSMENTS:** CR: Of Parachutes and Apples **MODIFIED ASSESSMENTS:** Students create a Flip Book with 6 pages: Title: Gravity p.1 – definition p.2 – shaping large objects p.3 – pressure p.4 – Sir Isaac Newton p.5 – gravity/matter/distance Small groups assigned to create a poster presentation on one of the 5 gravity topics. Students fill in their Flip Books during the presentations. Create a storyboard describing the pluses and minuses of having a machine that can turn gravity on and off (think about small scale and big scale.)	• Define gravity as the attraction of every particle of matter for every other particle of matter. • Explain that because gravity pulls toward the center of objects, it causes large objects like the Sun, planets, and moons to be spherical. • Explain that gravity creates enormous internal pressures within the Sun and planets. • Explain that gravity holds the atmosphere on Earth and other planets, with the greatest pressure at the surface. • Explain that Isaac Newton proved that the force that causes objects to fall to Earth (gravity) was the same force that holds the Moon in orbit around the Earth. • Explain that the same understanding of how gravity causes objects to orbit each other describes how the solar system, galaxies, and the entire universe hold together.	**Focus on PS, Ch 11:1, and 12:2,3** *PH FoPS, Ch 2:3,5*	***KEY VOCABULARY:*** **gravity** attraction **planets** **orbital** **spherical** galaxy ***GRAPHIC ORGANIZERS:*** Circle Map: gravity Flow Map: gravity (as the concept) with Sun, planets, Earth, Newton, and universe on the left and the effects of gravity listed on right side. ***SKILLS FOCUS:*** model, compare, identify ***LABS / DEMOS / VISUALS:*** • Focus on PS, Science Concepts, "Scaffolding", p. 467 TE Good questions, but answers are misleading. For second question, a better answer is, "Gravity changes the velocity's direction into a huge curve. At the orbital distance, if the velocity stays the same, it will balance gravity's pull. The velocity does stay the same, because there is no friction in outer space. For the fourth question, change the answer to, "It would move further away from the Earth. If it has enough velocity, it may even escape Earth's gravity.	5 Days



Density and Buoyancy (cont'd) *8% CST*

8. All objects experience a buoyant force when immersed in a fluid.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced. **(8,c)** [CST] **DISTRICT ASSESSMENTS:** PT: Whatever Floats Your Boat **MODIFIED ASSESSMENTS:** In small groups, students measure the volume of various objects then measure the water the objects displace, recording the results in a 3 column data table: object's name, weight, and displaced water weight. Students need to explain Archimedes' principle as they are weighing the objects.	• Explain that buoyant force is equal to the weight of the volume of fluid displaced by an object. • Explain that the net force acting on a submerged body is the difference between the upward buoyant force and downward pull of gravity on the object (the object's weight). • Explain that if a submerged solid object weighs less than the volume of fluid it displaces, the object will rise to the surface and float. • Explain that if a submerged solid object weighs greater than the volume of fluid it displaces, the object will sink. • Explain that if the weight of the object and the volume of fluid it displaces are the same, the object is said to be neutrally buoyant and will not sink or rise to the surface.	**Focus on PS, Ch 3:2,3** *PH FoPS, Ch 3:3*	***KEY VOCABULARY:*** magnitude values buoyant submerged ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble buoyant vs. submerge Circle Map: buoyancy ***SKILLS FOCUS:*** Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** Evaluate the accuracy and reproducibility of data. **(I&E 9.b)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Launch Lab, "Beach Ball Under Water", p. 127 • Focus on PS, Super DVD, Ch 3 Video Lab, "Measuring Buoyant Force" • Focus on PS, Mini Lab, "Buoyant Force", p. 149 • **Foil Lab** Students use a six-inch square of aluminum foil to create a "boat". Compare buoyancy of boats by adding pennies until the boat sinks. The maximum buoyant force is the weight of the boat just before sinking.	4 Days
… how to predict whether an object will float or sink. **(8,d)** [CST] **DISTRICT ASSESSMENTS:** PT: Whatever Floats Your Boat **MODIFIED ASSESSMENTS:** In small groups, students are asked to discuss the sinking of the Titanic and why they believe it sank. Then they are asked to imagine that they are reporters and have been asked to write a newspaper column the day after the Titanic sank. The column needs to explain why the unsinkable ship sank after striking an iceberg. Remind students to think about what they have learned about density, volume, and buoyancy when solving this problem and writing this column. Focus on PS, Performance Assessment within text, p. 88.	• Explain that the most direct way to predict whether a substance or solid object will sink or float in a fluid is to compare the density of the substance or object with the density of the fluid either by measuring or my looking up values on a table of densities. • Explain that if an object is less dense than the liquid, it will float. • Demonstrate or illustrate how materials with densities greater than that of a liquid can be made to float if they can be shaped to displace a volume of the liquid equal to their weight before they submerge completely. • Explain how the density of liquids can be measured by using a hydrometer. *(See p. 82 Discover Activity)* The length of a hydrometer submerged in an unknown liquid (V) compared with the length submerged in water (W) can be used to determine the density of the unknown liquid (W/V). The ratio works because the density of water is 1.0 g/mL.	**Focus on PS, Ch 3:3** *PH FoPS, Ch 3:3*	***KEY VOCABULARY:*** density hydrometer submerged ***GRAPHIC ORGANIZERS:*** Circle Map: hydrometer ***SKILLS FOCUS:*** Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • Focus on PS, Investigation Lab, "Homemade Hydrometer", p. 156-7 • GEMS: Ocean Currents, Activity 4, "Layering Liquids", p. 71-85 • Focus on PS, Ch 3 Fast File, "Buoyant Forces", p. 21 and "Controlling a Hot-Air Balloon", p. 22 • Focus on PS, Lab Manual, "Floating in Freshwater and in Ocean Water", p. 21-2	3 Days

Earth in the Solar System (Earth Science) *12% CST*

4. The structure and composition of the universe can be learned from studying stars and galaxies and their evolution.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… galaxies are clusters of billions of stars and may have different shapes. **(4,a)** [CST] **DISTRICT ASSESSMENTS:** CR: In a Galaxy Far, Far Away **MODIFIED ASSESSMENTS:** Individual students create a 3-part foldable to show the 3 most common galaxy shapes: spiral, elliptical and irregular. Label, illustrate and explain each. (Use a pyramid fold and display.) Option: Individual students build the 3 shapes of the galaxies using pipe cleaners. Label and explain each.	• Explain that stars are not uniformly distributed throughout the universe, but clustered by the billions in galaxies. • Recall that some of the fuzzy points of light in the sky that were originally thought to be stars, are now known to be distant galaxies. • Explain that galaxies appear to form clusters that are separated by vast expanses of empty space. • Describe how galaxies are classified by their differing sizes and shapes. • Draw examples of the most common galaxy shapes (spiral, elliptical, irregular). • Explain how astronomers have inferred the existence of planets orbiting some stars.	**Focus on PS, 12:3** *PH FoPS, Ch 24:2,4*	***KEY VOCABULARY:*** **galaxy** **elliptical** **cluster** **spiral** ***GRAPHIC ORGANIZERS:*** Triple Venn Diagram or Triple Bubble: irregular vs. elliptical vs. spiral Circle Map: galaxy ***SKILLS FOCUS:*** classify, Infer from evidence ***LABS / DEMOS / VISUALS:*** • **Photos of Astronomical Objects:** o www.nasa.gov o www.space.com • Focus on PS , Data Lab, "Universe Expanding", p. 535	2 Days
… the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color. **(4,b)** [CST] **DISTRICT ASSESSMENTS:** CR: In a Galaxy Far, Far Away **MODIFIED ASSESSMENTS:** Individuals make a 3-Tab foldable on the life of the stars. Make a hamburger fold with notebook paper and make 2 cuts in the top half to have 3 equal size flaps (cut from edge of paper to center). Label each flap: 1 – while dwarf 2 – neutron star 3 – black hole Under each flap write parallel descriptions of how they are alike and how they are different. Outline or make a Flow Map of the life cycle of a star and include Illustrations. Partners using the H-R diagram, locate several stars from a given list and explain the brightness and the temperature of each.	• Explain that the sun is a star located on the rim of a typical spiral galaxy called the Milky Way, and orbits the galactic center (which in similar spiral galaxies appears as a bulge of stars in the middle of the disk). • Identify the bright band of stars cutting across the night sky as the Milky Way galaxy as seen from Earth, which lies within the disk of the galaxy. • Use the Hertzsprung-Russell (H-R) Diagram to describe and estimate the age of stars. o Classify stars according to size, temperature and color. o Explain typical life cycles of a star. • Explain that light from the Sun and other stars indicates that the Sun is a fairly typical star. • Use a "black-body" temperature spectrum chart to identify star colors in order from coolest temperatures (red) to moderate temperatures (yellow, like the Sun at 5,500°C) to hottest temperatures (blue). *Alternatively, students could explain the black body radiation spectrum by describing how, as metal gets heated, it goes from red hot, to orange, to yellow, to white hot. Arc welders use even higher temperatures causing sparks that give off blue and even ultraviolet light.*	**Focus on PS, 12:1** **Hertzsprung-Russell Diagram, p. 515** *PH FoPS, Ch 23:2 and 24: 2-4*	***KEY VOCABULARY:*** **galactic disk** **luminosity** H-R Diagram **black body radiation** ***GRAPHIC ORGANIZERS:*** Circle Map: H-R Diagram ***SKILLS FOCUS:*** classify, draw conclusions from data ***LABS / DEMOS / VISUALS:*** • Focus on PS, Design Your Own Lab; "A Star is Born", p. 536-7 (Research Project) • Focus on PS, Lab Manual, "Absolute and Apparent Magnitudes", p. 81-4	4 Days

Earth in the Solar System (Earth Science) (cont'd) *12% CST*

4. The structure and composition of the universe can be learned from studying stars and galaxies and their evolution.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… how to use astronomical units and light years as measures of distance between the Sun, stars, and Earth. **(4,c)** [CST] **DISTRICT ASSESSMENTS:** CR: Star Search **MODIFIED ASSESSMENTS:** Partners construct a data table that illustrates in AUs the distances between the Sun and each planet and the distances between the planets. Explain why normal units of distance are not used.	• Explain that distances from astronomical objects are so enormous that measurement in units such as centimeters, meters, and kilometers are not useful. *(Similar logic explains why we do not count our age in seconds, hours, or days.)* • Define astronomical units (AU) as the average distance from the Earth to the Sun *(1 AU = $1.496x10^{11}$ meters)*. • Explain why AUs are useful for measuring distances within the solar system. • Measure and graph a scaled model of the solar system showing distances between the Sun and each planet, and between planets of the solar system, in astronomical units (AUs). • Explain that interstellar and intergalactic distances need an even larger unit of length, and are expressed in terms of how far light travels in one year *(one light year (ly) = 9.462 $x10^{15}$ meters, or approximately 6 trillion miles)*. • Explain that the most distant objects in the universe are estimated to be 10 to 15 billion light years from the solar system.	**Focus on PS,** **11:1 p. 466 (AU)** **12:1 p. 509 (ly)** **12:3 p. 531 (ly)** *PH FoPS, Ch 24:2*	***KEY VOCABULARY:*** astronomical object **astronomical unit (AU)** **interstellar** **intergalactic** **light year (ly)** ***GRAPHIC ORGANIZERS:*** Circle Maps: light year and astronomical unit ***SKILLS FOCUS:*** Calculate using scientific notation ***LABS / DEMOS / VISUALS:*** • **Solar System Scale Model** Students create a scaled drawing of the solar system using AUs as the basic measuring unit on cash register tape or using sidewalk chalk on a sidewalk or blacktop area. CA Science Framework, p. 138 • Focus on PS, Launch Lab, "Measure Distance", p. 459 • Focus on PS, Mini Lab, "Modeling the Size of Nebulae", p. 520 • Focus on PS, Super DVD Ch 12 Video Lab, "Measuring Parallax" • **The Effects of Distance** Calculate distances to astronomical objects in AU and ly. Explain how these distances would impact radio signals.	3 Days

Earth in the Solar System (Earth Science) (cont'd) *12% CST*

4. The structure and composition of the universe can be learned from studying stars and galaxies and their evolution.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light. **(4,d)** [CST] **DISTRICT ASSESSMENTS:** CR: In a Galaxy Far, Far Away **MODIFIED ASSESSMENTS:** Individuals create a 2-sided foldable from a hotdog fold: example: *Side 1* Galactic Luminators — SUN *Side 2* Galactic Illuminators — Moon Add many more examples and explain why they are sources of light or reflect light. Small Group Creative Research Mission presentation: "Exploratory Space Mission" • name the mission • name the spacecraft • if manned, give names of the astronauts, or if unmanned give the destination(s) • length of mission • scientific information yielded • most interesting part of the mission to the students • describe various aspects, like food, free time, excursions outside the space craft Give personal opinions on whether the cost and gains from the mission are justified compared with how the money could have been spent in other needed programs.	• Explain that the light energy from the Sun and other stars is caused by nuclear fusion reactions that occur deep inside the stars' cores. o List the elements that are most abundant in stars *(primarily hydrogen, a smaller amount of helium, and much smaller amounts of all the other elements)*. o Explain that nuclear fusion is the result of small atom nuclei colliding at high speed (hot temperature) until they stick together to form a larger nucleus, which releases a large amount of energy. o Explain how most stars are born from the gravitational compression, which heats and squeezes hydrogen gas until fusion reaction begins. o Explain that a stable star has a balance between the inward pull of gravity and the outward pressure from the heat of the fusion reaction. • Explain that ancient peoples observed that some objects in the night sky were fixed (constellations) and some were "wanderers" (planets). • Explain that careful observations showed that planets travel in nearly circular (slightly elliptical) orbits about the Sun. • Distinguish between stars, which are sources of light energy, and other bright objects in outer space that shine by reflected light, not by their own light, such as the Moon and planets. • List examples of exploratory space missions that have yielded information about our solar system, including spacecraft flying by or orbiting astronomical bodies, soft landing of spacecraft fitted with instruments, and the visits of astronauts to the Moon.	**Focus on PS, 12:1,2** *PH FoPS, Ch 5:3, 16:4, 22:2-4, 23:2, and 24:1,3*	***KEY VOCABULARY:*** **nuclear fusion** **constellation** compression eclipses **planets** **elliptical** ***GRAPHIC ORGANIZERS:*** Venn Diagram: constellation vs. planets Circle Map: nuclear fusion Bubble Map: stars ***SKILLS FOCUS:*** observe, read charts, research ***LABS / DEMOS / VISUALS:*** • Focus on PS, Data Lab, "Identify Elements in a Star", p. 517 • Focus on PS, Lab Manual, "Spectral Analysis", p. 85-7 • **History of Space Exploration Research** Have groups of students research and report on various space exploration programs, highlighting the methods used and the information gathered. • **Modeling Reflection** Use an eclipse or the phases of the Moon to show that planets (and the Moon) do not generate the light that makes them visible. • **Researching Reflection** Students research and describe some of the information about the reflectivity, structure, and composition of the Moon and the planets yielded by exploratory space missions. • GEMS: Earth, Moon, and Stars • NASA Solar System Exploration website, Missions http://solarsystem.nasa.gov	5 Days

Earth in the Solar System (Earth Science) (cont'd) *12% CST*

4. The structure and composition of the universe can be learned from studying stars and galaxies and their evolution.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST:10%.)	Appx Time (per 180 days)
… the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids. **(4,e)** [CST] **DISTRICT ASSESSMENTS:** CR: In a Galaxy Far, Far Away **MODIFIED ASSESSMENTS:** Small groups create a mnemonic for memorizing the 9 planets in their order from the Sun and each presents theirs to the class. Individuals create a Flip Book on the 9 planets. It includes information on their size, distance from the Sun, period of revolution about the Sun, period of rotation about their own axis, tilt of axis, composition, atmosphere, appearance and any other interesting information researched. A planet can be assigned to each group to research and present. As each group presents the other students fill in their Flip Books. Culminating Activity: "Solar System Trading Cards" Individuals select 6 objects in the Solar System: Sun, inner planet, outer planet, and either a comet, asteroid or meteoroid. Each student adds two more of their choice. One side of card is the name and an illustration. The back of the card contains 5 or more facts about the object. Focus on PS, Performance Assessment book, p.68.	• Identify the names and relative order of orbits of the nine known planets in the solar system. • Recall how the planets compare with respect to size, distance from the Sun, period of revolution about the Sun (length of year), period of rotation about their own axis (length of day), tilt of axis, composition, atmosphere, and appearance. • Contrast the inner planets from the outer planets. • Explain how objects in the solar system attract toward one another gravitationally, with the Sun being, by far, the most massive object and exerting the strongest gravitational force. • Identify relatively small objects made of mostly rock (asteroids) or the ice of condensed gases (comets) that also orbit the Sun. • Locate the asteroid belt on a diagram of the solar system. • Identify the natural objects orbiting planets as satellites or moons.	**Focus on PS, 11:1,3,4** *PH FoPS, Ch 23:1,3-5*	***KEY VOCABULARY:*** orbit, **period**, **revolution**, **rotation**, **axis**, planet, **asteroid**, **comet**, **asteroid belt**, **satellite**, **moon** ***GRAPHIC ORGANIZERS:*** Venn diagram or Double Bubble Map: rotation vs. revolution Circle Map: orbit ***SKILLS FOCUS:*** research, recall, describe, identify ***LABS / DEMOS / VISUALS:*** • **Planetary Travel Agency** Groups of students choose a planet and create a futuristic travel brochure to their planet, which includes accommodations and activities that relate to the temperature, gravity, atmosphere, length of day, length of year, etc., etc. • NASA Solar System Exploration website: images, articles, fact lists, "kid-friendly" section, missions, etc. http://solarsystem.nasa.gov • Focus on PS, Data Lab, "How Large are the Planets?", p. 485 • Focus on PS, More to Discover, Addressing Naïve Conceptions, p. 744 TE • Focus on PS, Mini Lab, "How do Craters Appear?", p. 492 • Focus on PS, Lab, "Model the Solar System", p. 494-5	5 Days

End District Quarter 3 Exam Material

Physical Principles in Living Systems (Physical Science) *0% CST*

(CA 7th Grade Standard Set)

6. Physical principles underlie biological structures and functions.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… visible light is a small band within a very broad electromagnetic spectrum. **(7-6,a)** **DISTRICT ASSESSMENTS:** CR: Can't You See it? **MODIFIED ASSESSMENTS:** Class creates a giant EM spectrum. Small groups are each assigned a portion of the spectrum to create visuals and explanations to share with the class. Finished product can be posted in class or hallway. Partners use prisms to disperse white light into colors of the spectrum. Each student then diagrams and explains the results. Small groups create a poster with pictures relating to radio waves, microwaves, infrared waves, visible light, ultraviolet rays, x-rays, and gamma rays. They are to include written descriptions of these waves and their applications. They should also include any associated dangers.	• Draw and label a diagram that arranges electromagnetic waves on a continuum from longest to shortest wavelength (electromagnetic spectrum). • Explain that visible light is a very small band within a very broad electromagnetic (EM) spectrum. • Describe some common applications of EM waves based on their wavelengths, including AM and FM radio, television, radar, microwaves, and infrared radiation. • Explain that the human eye can see wavelengths from about 800 nanometers (0.000 000 8 meter) that appear red, to 400 nanometers (0.000 000 4 meter) that appear blue/violet. • Describe how the colors (ROYGBIV) in the visible spectrum are not discrete, but overlap each other as a continuous spectrum.	**Focus on PS, Ch 4:2 (p. 189-190, very brief) and 12:1 (p. 510-511) absorption spectra of stars** *PH FoPS, 7:1-2, 9:1-2, and 10:2*	***KEY VOCABULARY:*** **electromagnetic** (EM) **spectrum** **wave** **infrared** **continuum** **radiation** **wavelength** **nanometer (nm)** **frequency** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: nanometer vs. wavelength Circle Map: electromagnetic spectrum ***SKILLS FOCUS:*** Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time = λf). **(I&E 9.f)** ***LABS / DEMOS / VISUALS:*** • GEMS: Invisible Universe	4 Days

Physical Principles in Living Systems (Physical Science) (cont'd) *0% CST*

(CA 7th Grade Standard Set)

6. Physical principles underlie biological structures and functions.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… that for an object to be seen, light emitted by or scattered from it must be detected by the eye. **(7-6,b)** **DISTRICT ASSESSMENTS:** CR: Can't You See it? **MODIFIED ASSESSMENTS:** Partners sort cards by examples of luminous objects and illuminated objects. They explain to each other why each example is placed in the particular stack. Small groups assign each person a structure of the eye to research. Then using a diagram of the eye, each describes the part and how it functions in the process of vision. Small group creates a poster of how an image is seen by the eye from the moment the eye picks up the image to the point when it reaches the visual cortex of the brain. The poster needs to include the following: • illustrations with labels of each eye structure • explanation of the function of each structure • explanation of rods and cones • explanation of how light is converted to electrical impulses. Small groups present posters to the class.	• Explain that for an object to be seen, light emitted from a luminous object, or scattered by an illuminated object, must be detected by the eye. • Compare the color and brightness of light emitted from various luminous objects (i.e., the Sun, fluorescent light, incandescent bulb, etc.) ***NOTE: Remind students to never observe the Sun directly or they may permanently damage their vision.*** • Describe how illuminating light is absorbed, reflected, or refracted by an illuminated object to impart color and brightness. • Demonstrate how the color of an object depends on the source of the light and the way the object interacts with it. • Describe how light interacts with the cornea, pupil, and lens to create an image on the retina. • Compare the structure and function of the receptors on the retina – rod cells and cone cells. • Explain that the receptors on the retina convert light into electrical impulses that are transferred by the optic nerve to the visual cortex of the brain.	**Focus on PS,** Not Addressed *PH FoPS, 7:3, 9:3, and 10:1-4* *PH FoLS, 22:3-4*	***KEY VOCABULARY:*** **emit**, emission, **luminous**, **illuminate**, transparent, cornea, retina, lens, pupil, rod cells, cone cells, visual cortex ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: rod cells vs. cone cells and luminous vs. illuminate Brace Map: Eye and its structures Flow Map: process of vision ***SKILLS FOCUS:*** Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** Evaluate the accuracy and reproducibility of data. **(I&E 9.b)** ***LABS / DEMOS / VISUALS:*** • Cow / Sheep Eye Dissection • GEMS: Color Analyzers • "Our Sense of Sight: Part 1, Eye Anatomy and Function" Web site with background information, diagrams, and lab activities from Neuroscience for Kids. http://faculty.washington.edu/chudler/eyetr.html	4 Days

Physical Principles in Living Systems (Physical Science) (cont'd) *0% CST*

(CA 7th Grade Standard Set)

6. Physical principles underlie biological structures and functions.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… light travels in straight lines if the medium it travels through does not change. **(7-6,c)** **DISTRICT ASSESSMENTS:** PT: The A-maze-ing Path of Light CR: The Cat Food Bandit **MODIFIED ASSESSMENTS:** Partners demo refraction and explain why objects such as pencils look as if they are bending when partially placed in water.	• Explain that in a vacuum or uniformly transparent material, light travels in straight lines. • Demonstrate that light travels in straight lines if the medium it travels through does not change. • Describe how at the interface between two media or between a vacuum and a medium, light rays will bend if they enter at an angle other than perpendicular to the interface. • Explain what happens to the path of light when light travels from one transparent medium (such as air) into another transparent medium with different optical properties (such as water). • Explain that transparent materials, such as air and water, may have differing densities that cause light to bend as it passes through the material. • Explain that air heated by a campfire can cause objects to shimmer and that stars appear to twinkle because of variations in the density of air.	**Focus on PS,** Not Addressed *PH FoPS, 7:3, 9:1, and 10:2*	***KEY VOCABULARY:*** **uniformly** **transparent** **medium** optical **vacuum** **refract** **interface** density index of refraction ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: vacuum vs. medium Circle Map: refraction ***SKILLS FOCUS:*** observe, infer Construct appropriate graphs from data and develop quantitative statements about the relationship between variables. **(I&E 9.e)** ***LABS / DEMOS / VISUALS:*** • **Light Bending Explorations** Students explore the light bending properties of various transparent objects. For instance, by observing a pencil placed in a glass of water from various vantage points, students can confirm that the path of light changes direction as it passes from one medium to another. CA Sci. Framework, p 120 • **Light Bending Demonstrations** Demonstrate how mixing various clear liquids (water, alcohol, mineral oil, karo syrup) or observing the air above heat sources (candle, Bunsen burner) show how density changes in fluids bend light. CA Sci. Framework, p 120	2 Days

Physical Principles in Living Systems (Physical Science) (cont'd) *0% CST*

(CA 7th Grade Standard Set)

6. Physical principles underlie biological structures and functions.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope. **(7-6,d)** **DISTRICT ASSESSMENTS:** PT: The A-maze-ing Path of Light **MODIFIED ASSESSMENTS:** Small groups decide to do research on either the microscope or the camera to present to class. They need to use a model in their presentation and to identify each part from the model or an illustration and explain its function and applications. Students create a foldable to compare and contrast the eye to a camera.	• List several uses for simple lenses including magnifying glasses, cameras, telescopes, microscopes, and the eye. • Demonstrate how combinations of lenses are used in telescopes and microscopes to magnify objects. • Diagram how the cornea and lens of the eye take diverging light rays from an object and make them converge on the retina. • Determine the focal length of a lens by measuring the distance from the lens to the image it forms. • Demonstrate and explain how a simple lens forms a magnified virtual image when objects viewed at a distance closer than the lens' focal length – like a microscope. • Demonstrate and explain how a simple lens forms an inverted real image that can be projected onto surfaces when an object is viewed from a distance longer than the lens' focal length – like a camera.	**Focus on PS,** Not Addressed *PH FoPS, 7:3 and 10:2,4,5*	***KEY VOCABULARY:*** convex lens, optic, concave lens, **focal length**, **converging**, **virtual image**, **diverging**, **real image** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: concave lens vs. convex lens Circle Map: focal length ***SKILLS FOCUS:*** diagram, measure, investigate Evaluate the accuracy and reproducibility of data. **(I&E 9.b)** ***LABS / DEMOS / VISUALS:*** • **Modeling the Eye's Lens** Students use a simple magnifier to show how the cornea and lens transform diverging light rays from an object into rays of light converging to form a focused image. This can be done by focusing light from ceiling lights onto their desktop or by focusing light from windows or doorway onto a wall. Measuring the distance from the lens to the image gives the focal length of the lens. CA Science Framework, p. 121 • GEMS: Microscope Explorations (includes several activities with hand lenses and other magnifiers) • GEMS: More than Magnifiers	3 Days
… that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths. **(7-6,e)** **DISTRICT ASSESSMENTS:** CR: The Eyes Have it **MODIFIED ASSESSMENTS:** Partners create a poster that represents the spectrum of visible light from the longest to the shortest wavelength (ROYGBIV). On the poster each wavelength is labeled by its length and the relationship of the color to the angle of refraction is explained.	• Explain that white (visible) light may be dispersed into a spectrum of colors from red with the longest wavelength to violet with the shortest wavelength. • Explain that a prism disperses white light into colors of the spectrum because the angle of refraction is different for each color. • Describe that the closely spaced gaps in a diffraction grating can separate white light into its component colors because of constructive interference. • Explain that the human perception of color is due to the presence of the cone cells in the retina. • Explain how full-color printing is achieved using just 4 ink colors printed in dot combinations too small and close for the human eye to resolve.	**Focus on PS,** Not Addressed *PH FoPS, 7:2,3 9:2,3 and 10:2-4*	***KEY VOCABULARY:*** refraction, **diffraction grating**, **prism**, resolve, **constructive interference** ***GRAPHIC ORGANIZERS:*** Circle Map: prism Magic Boxes: all Key Vocabulary ***SKILLS FOCUS:*** observe Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** Distinguish between linear and non-linear relationships on a graph of data. **(I&E 9.g)** ***LABS / DEMOS / VISUALS:***	3 Days

Physical Principles in Living Systems (Physical Science) (cont'd) *0% CST*

(CA 7th Grade Standard Set)

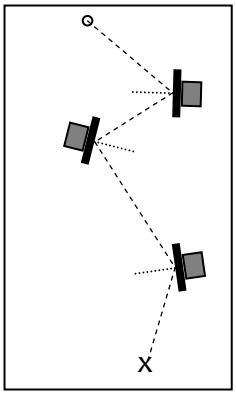
6. Physical principles underlie biological structures and functions.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… light can be reflected, refracted, transmitted, and absorbed by matter. **(7-6,f)** **DISTRICT ASSESSMENTS:** PT: The A-maze-ing Path of Light CR: The Cat Food Bandit CR: The Eyes Have it **MODIFIED ASSESSMENTS:** Small groups present, with explanations and demonstrations, the terms used in their 'Magic Box' (in the Graphic Organizers). Students make a 2–Tab Flap (hamburger fold) foldable to compare and contrast the terms: reflected light and refracted light. Partners present demos and explanations of how light changes when hitting smooth or rough surfaces.	• Define each of the interactions of light with matter: reflection, refraction, transmission, and absorption. • Demonstrate and explain that when light rays encounter a surface between two media, such as air and glass, the light may be refracted, reflected, or both at the surface. • Explain that light is transmitted through a transparent medium the atoms of the medium absorb and reemit the light energy. • Explain that light travels fastest through vacuum and progressively slower through more optically dense materials (diamond is the most optically dense transparent material). • Explain that light changes direction (refracts) when going from one medium to another because it changes speed, as long as the light does not hit perpendicular to the surface, in which case it will slow down (or speed up) but continue going straight. • Explain and give examples of how impurities or imperfections in transparent materials cause light to be scattered.	**Focus on PS,** Not Addressed *PH FoPS, 7:3 and 10:1-3*	***KEY VOCABULARY:*** reflection, transmission, **absorption**, **reemission**, re-emit, optical properties, **angle of incidence**, **angle of reflection**, **opaque**, **translucent** ***GRAPHIC ORGANIZERS:*** Triple Venn Diagram or Triple Bubble Map: opaque vs. translucent vs. transparent with examples of each. Circle Map: transmit Magic Boxes: reflection, refraction, transmission, and absorption ***SKILLS FOCUS:*** Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** Distinguish between variable and controlled parameters in a test. **(I&E 9.c)** ***LABS / DEMOS / VISUALS:*** • **Defining by Observing** Students compare the abilities of opaque, translucent, and transparent materials to absorb and scatter light. Students then create, share, and compare definitions. Adapted from the CA Science Framework, p. 122	4 Days

Physical Principles in Living Systems (Physical Science) (cont'd) *0% CST*

(CA 7th Grade Standard Set)

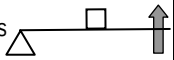
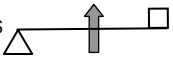
6. Physical principles underlie biological structures and functions.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… the angle of reflection of a light beam is equal to the angle of incidence. **(7-6,g)** **DISTRICT ASSESSMENTS:** PT: The A-maze-ing Path of Light CR: The Cat Food Bandit CR: The Eyes Have it **MODIFIED ASSESSMENTS:** Students make a 2-tab vocabulary book for 'angle of reflection' and 'angle of incidence'. • fold paper like a hamburger • cut front of paper in half from the edge to the fold • label each flap with the term • on the back of each half write the corresponding definition • across from the definition on the back use a ruler to draw an example of each angle and label Explain how to measure the angle from the perpendicular line.	• Demonstrate how to draw a normal line perpendicular to the surface of a reflective surface on a diagram. • Diagram how a light beam reflecting off of a shiny surface forms a reflected angle equal to the incident angle (both measured from the normal line). • Explain how this applies to real life situations (i.e., adjusting mirrors in a car, shooting pool, or avoiding glare).	**Focus on PS,** Not Addressed *PH FoPS, 7:3 and 10:1* Sample "Light Race":  	***KEY VOCABULARY:*** **normal line** **angle of incidence** **perpendicular** **angle of reflection** ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble Map: angle of incidence vs. angle of reflection ***SKILLS FOCUS:*** use a protractor ***LABS / DEMOS / VISUALS:*** • **Light Race** On a piece of butcher paper, students draw a start circle and a finish "x" at opposite ends. Then students use protractors and string or meter sticks to set up three plane mirrors (attached to blocks) between the start and finish. When complete, the teacher uses a laser pointer to see if the beam will complete the race.	2 Days

Physical Principles in Living Systems (Physical Science) (cont'd) *0% CST*

(CA 7th Grade Standard Set)

6. Physical principles underlie biological structures and functions.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… how to compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints). **(7-6,h)** **DISTRICT ASSESSMENTS:** OES: **MODIFIED ASSESSMENTS:** Students create a 3-flap foldable for the 3 Classes of Levers. Fold paper like a hamburger and divide the top half evenly into 3 sections and make two cuts from the edge to the fold. Label each of the 3 Flaps, 1st, 2nd, and 3rd Class Lever, and draw its example. On the back of each flap describe the lever and how it increases mechanical advantage. On the back page across from its flap illustrate an example of the lever being used. Label its fulcrum, input and output. In small groups have students present foldables and give feedback. Students construct a Flip Book for the joints and hinges in body. Students are to illustrate at least three (hinge, ball-and-socket, and sliding) and explain their range of motion. Then compare it to one of the three classes of levers. Label the fulcrum, input, and output for each joint and hinge.	• Recall that Archimedes first describes levers as a rigid rod that is able to rotate around a fixed pivot point called a fulcrum. • Identify the three classes of levers. • Identify various examples of levers, pointing out the fulcrum, input point, and output point. (i.e., a rake is a third class lever where the top hand is the fulcrum, the input point is the lower hand, and the output point is bottom of the rake.) • Define work as force applied times the distance over which it is applied, or **W = F x d**. • Explain and model how 1st and 2nd class levers can give a mechanical advantage when lifting heavy objects according to the principle: input W = output W small F x LARGE d = LARGE F x small d A small input force applied over a long distance can generate a large output force over a small distance. • Explain that joints in the human body act as fulcrums for the bones acting as levers, while the muscles provide the force. • Identify arm and leg muscles as examples of 3rd class levers that work the opposite of gaining mechanical advantage in that they amplify a large force applied by muscle over a short distance into long, rapid motions such as running or swinging a baseball bat. • Compare the joints in the wrist, shoulder, and thigh with structures used in machines and simple devices like a hinge, ball-and-socket, and sliding joints.	**Focus on PS,** Not Addressed *PH FoPS, 2:1,2 and 4:1,3,4* 1st Class  2nd Class  3rd Class 	***KEY VOCABULARY:*** **lever** **apply** **fulcrum** input **force** output **work** **amplify** rigid rod ***GRAPHIC ORGANIZERS:*** Venn Diagram or Double Bubble lever vs. fulcrum Circle Map: force ***SKILLS FOCUS:*** model, classify Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (Word = Force x distance). **(I&E 9.f)** ***LABS / DEMOS / VISUALS:***	4 Days

Physical Principles in Living Systems (Physical Science) (cont'd) *0% CST*

(CA 7th Grade Standard Set)

6. Physical principles underlie biological structures and functions.

Standards and Assessments "Students know…"	Task Analysis "Students are able to …"	Adopted Textbook Correlation(s)	Connections (All I&E standards may be assessed on 8th Grade CST: 10%.)	Appx Time (per 180 days)
… how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system. **(7-6,i)** **DISTRICT ASSESSMENTS:** OES: **MODIFIED ASSESSMENTS:** Small groups assigned to present one of the 3 classes of levers. Each group builds and presents one class of lever in detail. They explain how levers offer mechanical advantage and give several examples. Also, they relate their class of lever to a particular joint in the body pointing out the bone as the lever and the joint as the fulcrum.	• Recall that a bone acts as a lever and a joint as the fulcrum, while muscles supply the force and connective tissue transfers the force to specific places that give an individual leverage for motions. • Explain how levers can be used to take advantage of force or speed. • Build levers and hinges to show how levers may be used to increase force at the expense of distance (like a crowbar) or increase distance at the expense of force (hand powered catapults, for instance). *If time permits:* ∗ *Define and give examples of the other types of simple machines.* ∗ *Make examples of various simple machines and explain how it gives a mechanical advantage.*	**Focus on PS,** Not Addressed *PH FoPS, 4:1-4*	***KEY VOCABULARY:*** **mechanical advantage** motion machine **leverage** **simple machine** ***GRAPHIC ORGANIZERS:*** Circle Map: mechanical advantage with examples ***SKILLS FOCUS:*** build, explore Plan and conduct a scientific investigation to test a hypothesis. **(I&E 9.a)** ***LABS / DEMOS / VISUALS:*** • **Law of the Lever Explorations** Students explore the three types of levers using meter sticks, weight holders, hooked weights, a pivoting support, and spring scales. They should record their observations, then organize and summarize them, making applications to practical, real world levers.	3 Days
… that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system. **(7-6,j)** [LS10] **DISTRICT ASSESSMENTS:** OES: **MODIFIED ASSESSMENTS:** Partners research and present "Why we have valves in the heart". Small groups create simulations to explain the process of blood flowing through the heart. Each group presents to class.	• Recall that the heart is a pump in which blood enters a chamber through a blood vessel. • Explain how a valve closes off a blood vessel to prevent blood from flowing in the wrong direction. • Define pressure as the force per unit of area and is measured in various units, such as millimeters of mercury (mmHg). • Explain that when the heart muscle contracts, it squeezes the blood (increases the pressure in the chamber), which forces the blood into another blood vessel.	**Focus on PS,** Not Addressed *PH FoPS, 2:1,2,4 and 3:1,2*	***KEY VOCABULARY:*** **contraction** physiology **pressure** **valve** squeeze ***GRAPHIC ORGANIZERS:*** Circle Map: contraction ***SKILLS FOCUS:*** Construct appropriate graphs from data and develop quantitative statements about the relationships between variables. **(I&E 9.e)** ***LABS / DEMOS / VISUALS:*** • **Heart Research** Students can study a model of the heart (available at the SMRC) or do research to learn more about the physiology of the heart. CA Science Framework, p. 123	2 Days

Also include 3 designated lessons of state mandated health education from Project ALERT

Materials and training are available through the Health Curriculum Office (Ext 2967).

APPLICATION OF COURSE CONTENT: ***Career Connections***

Related Major Skills & Characteristics – objective observation, careful measurement, curiosity, problem solving, organizational skills, numerical reasoning, ability to analyze & interpret data, critical thinking, reading comprehension, concise and accurate communication skills, computer literacy, logical thinking, team skills, testing skills, practical safety awareness, evidence evaluating

Related Careers – Students who continue in the sciences can prepare for the following careers:

Aeronautical Engineer *(Rocket Scientist)*
Analytical Chemist
Astronaut
Astronomer
Automotive Engineer
Biochemist
Biotechnologist
Chemical Engineer
Chemist
Electrical Engineer
Fire Fighter
Geneticist
Materials Scientist
Mechanical Engineer
Medical Researcher
Nuclear Physicist
Nurse
Physician
Physicist
Professor
Quality Control Specialist
Radiologist
Science Fiction Writer
Teacher
Technical Editor
Transportation Engineer

METHODS:

Lesson Design & Delivery: Teachers will incorporate these components of lesson design during direct instruction and inquiry activities. The order of components is flexible, depending on the teacher's vision for the individual lesson. For instance, the objective and purpose, while present in the teacher's lesson plan, are not made known to the students at the beginning of an inquiry lesson.

Essential **E**lements of **E**ffective **I**nstruction Model for Lesson Design Using Task Analysis	Anticipatory Set Objective Standard Reference Purpose Input Modeling Check for Understanding Guided Practice Closure Independent Practice

Some components may occur once in a lesson, but others will recur many times. Checking for understanding occurs continually; input, modeling, guided practice and closure may occur several times. There may even be more than one anticipatory set when more than one content piece is introduced.

Active Participation: Teachers will incorporate the principles of active participation and specific strategies to ensure consistent, simultaneous involvement of the minds of all learners in the classroom. Teachers should include both covert and overt active participation strategies, incorporating cooperative learning structures and brain research. Some of the possible active participation strategies include:

COVERT	OVERT (Oral)	OVERT (Written)	OVERT (Gestures)
• Recall • Imagine • Observe • Consider	• Pair/Share • Idea Wave • Choral Response • Give One, Get One • Socratic Seminar • Cooperative Discussion Groups (i.e. Talking Chips, Gambit Chips)	• Restate in Journals / Notes • Response Boards • Graphic Organizers • Folded Paper • Ticket Out of Class	• Hand Signals • Model with Manipulatives • Stand up / Sit down • Point to Examples

Baldridge Quality Tools: Students can become more positively involved in their education through goal setting, self-assessment, and data tracking and analysis by making use of the following strategies:

BALDRIDGE TOOL	PURPOSES
Affinity Diagram	– finding consensus, organizing complex information
Flowchart	– describing a process, planning a project, identifying problem steps in a process
Force Field Diagram	– identifying obstacles, finding causes and solutions to problems
Issues / Ideas Bin	– handling individual questions/requests without stopping a group activity, providing anonymous input, obtaining diverse input in specific areas.
Data Folder	– tracking goals and actual results
Plus / Delta	– tracking improvement efforts, identifying opportunities for change, finding out what's working and what's not working in a process, procedure, activity, etc.
Class Data Graphs	– displaying trends for goal setting

Learning styles and learning challenges of your students may be addressed by implementing combinations of the following:

Reading Strategies in Science
- ❑ Learning Logs
- ❑ Pre-teaching
- ❑ Vocabulary
- ❑ Pre-reading
- ❑ Text Structures
- ❑ Trail Markers
- ❑ Reciprocal Teaching
- ❑ Functional Text

SDAIE Strategies for English Learners
- ❑ Tapping/Building Prior Knowledge (Graphic Organizers, Schema)
- ❑ Grouping Strategies
- ❑ Multiple Intelligences
- ❑ Adapt the Text
- ❑ Interactive Learning (Manipulatives, Visuals)
- ❑ Acquisition Levels
- ❑ Language Sensitivity
- ❑ Lower the Affective Filter (including Processing Time)
- ❑ Home/School Connection (including Cultural Aspects)

Differentiation for Advanced Learners
- ❑ Curriculum Compacting
- ❑ Tiered Assignments
- ❑ Flexible Grouping
- ❑ Acceleration
- ❑ Depth and Complexity
- ❑ Independent Study

Significant, Proven Science Strategies for ALL Science Students
- ❑ Hands-On Labs
- ❑ Inquiry Activities
- ❑ Written/Oral Presentations
- ❑ Short/Long-term projects
- ❑ Essential Questions
- ❑ Summarization
- ❑ Current Events
- ❑ Peer Teaching
- ❑ Guest Speakers

Please note that these strategies often overlap and should not be limited to specifically defined courses or student populations.

MATERIALS:

Basic Textbook and Supplementary Materials: Glencoe Science: Focus on Physical Science (CA Grade 8), Glencoe McGraw Hill © 2007

eguidance.com web site for exploring careers
safety equipment: goggles, latex gloves, fire extinguisher
glassware: flasks, beakers, test tubes, etc.
measuring devices: triple beam balance, rulers, volumetric containers
chemical reagents
microviewers, hand lenses
appropriate technology

❖ Many items are available through Science/Math Resource Center (SMRC).

SUPPORT FOR ENGLISH LANGUAGE LEARNERS:

Resources Accompanying the Basic Text:

Printed Study Guide (chapter summaries) available in five languages
Student workbooks available in Spanish
Text chapters on audiocassette available in English and Spanish
Unit review videos available in English and Spanish
Suggested alternate/supplemental activities geared for ELL's

- Hands-on activities and projects
- Supplemental audio/visual content materials
- Computer resources available through software and the internet
- Newspapers and magazines
- Guest speakers
- Posters and models
- Graphs and data tables
- Music and songs

RESOURCES:

Documents

- Science Framework: ..... http://www.cde.ca.gov/re/pn/fd/documents/scienceframework.pdf
  [or find it posted in sections at the LBUSD Science Office website]
- CST / NCLB Test Blueprints: ..... http://www.cde.ca.gov/ta/tg/sr/blueprints.asp
- CST Reference Sheets: ..... http://www.cde.ca.gov/ta/tg/sr/cstsciref.asp
- CST Released Test Questions http://www.cde.ca.gov/ta/tg/sr/css05rtq.asp
- National Science Standards: ..... http://www.nap.edu/readingroom/books/nses/html/
- Science Safety Handbook for CA Public Schools (1999)
  can be ordered from the CDE at ..... http://www.cde.ca.gov/re/pn/rc/
- LBUSD Approved Chemicals List, Chemical Hygiene Plan, and Science Fair Resources:
  http://www.lbusd.k12.ca.us/Main_Offices/Curriculum/Areas/Science/teacher_resources.cfm

District Offices

- Science Curriculum Office (562) 997-8000 (ext. 2963)
  - K-12 science standards, curriculum, professional development, science fair
- Science / Math Resource Center (SMRC) (562) 997-8000 (ext. 2964)
  - hands-on materials, consumable material orders, alternative standards-based curriculum packets
- Instructional Materials Workshop (IMW) (562) 997-8000 (ext. 2965)
  - standards-based instructional materials
  - content integrated instructional materials
  - monthly theme-based literacy supplements for science
  - wood shop / lumber room
  - copying, enlarging, and laminating
- Office of Multimedia Services (OMS) (562) 997-8000 (ext. 7145)
  - videos for check out to fit the curriculum (see your librarian for current catalogs)
  - district TV channels programming
- PALMS Office Program Assistance for Language Minority Students (562) 997-8000 (ext. 8031)
  - technical assistance and professional development for English Language Development (ELD) and Specially Designed Academic Instruction In English (SDAIE)
  - assistance in the implementation and maintenance of programs addressing the needs of English Language Learners (ELLs)
- Health Curriculum Office (562) 997-8000 (ext. 2967)
  - curriculum and training for mandated health content

EVALUATION: Student achievement in this course will be measured using multiple assessment tools. Assessments will be used for diagnosing student understanding before instruction, monitoring student learning during instruction, and evaluating student understanding after instruction.

SUGGESTED EVALUATION TOOLS:

Source	Diagnose	Monitor	Evaluate
State Assessment			Content Standards Test – 8th Grade Science
District Developed Assessments	Grade Level Pretest	Open-Ended Science Performance Task	End of Course Exam Open-Ended Science
Glencoe Science: Focus on Physical Science	Reading Essentials: Before You Read Launch Labs New Vocabulary	Reading Check questions Science Notebook, "Summarize It" Lesson Review: Summarize, Using Vocabulary, Understanding Main Ideas, Applying Science Reading Essentials: Think it Over, Reading Check, Picture This Applying Math Foldables Active Folders Mini Lab and Lab Standards Review	Standards Assessment Performance Assessment Sci Activities for Adv. Learners Chapter & Unit Tests Rubric Scored Projects, Labs, and Writings
Teacher Developed Assessments	Accessing Prior Knowledge Activities Pre-quiz Pre-Test Vocab. Knowledge Rating	Warm-Up Quiz Proving Behavior Lab	Open-ended Prompts Chapter / Unit Test Practicum Semester Final Exam

SUGGESTED GRADE WEIGHTING:

(with some possible examples)

1. Assessment ~30%
   - o objective tests including comprehensive finals
   - o performance tasks (rubric scored)
   - o open-ended questions (rubric scored)
   - o portfolios
   - o student self-evaluations
2. Homework not more than 10%
   - o discovery assignments
   - o assignments reinforcing class lesson
   - o essays
   - o organization
   - o research
3. Labs ~20%
   - o lab reports
   - o active participation
4. Projects ~20%
   - o science fair projects
   - o research-based reports and projects
5. Classwork ~20%
   - o note taking skills
   - o organization skills
   - o oral presentations
   - o individual and group projects and assessments

STANDARD GRADING SCALE:		
Advanced Proficient	A	90 – 100%
	B	80 – 89%
Proficient	C	70 – 79%
Partial Proficient	D	60 – 69%
Not Proficient	F	0 – 59%

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School: Science Office
Date: 6/2/08
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