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Los Angeles Unified School District  
Science Instructional Guide Grades 6, 7, 8
## Los Angeles Unified School District
Science Instructional Guide Grades 6, 7, 8

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ACKNOWLEDGEMENTS

This publication reflects the collaborative effort of many educators. This Instructional Guide is based on the Science Instructional Guide Version 1.1 and builds on the foundation provided by the Science Framework for California Public Schools and the Science Content Standards for California Public Schools, Kindergarten Through Grade 12. Appreciation is extended to the following educators who worked on this publication:

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This publication reflects the collaborative effort of the many educators. This revision of Publication No. SC-863.19 (Revised 2001) is based on the Science Content Standards for California Public Schools, Kindergarten Through Grade 12. Appreciation is extended to the following educators who worked on the past and present publications:

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Foreword:

In 1996, the Los Angeles Unified School District adopted student-learning standards in Science, History/Social Studies, Mathematics and Language Arts. By adopting standards, the District joined with nationwide reform efforts. These efforts were given impetus by the passage of three legislative acts which emphasize the need for school districts to establish standards for what students should know and be able to do upon high school graduation. Goals 2000 (PL 103-227), Improving America’s Schools Act (PL 103-382), and the School-to-Work Opportunity Act (PL 103-239). The Individuals with Disabilities Act Amendments of 1997 also calls for districts to maintain high academic standards and clear performance goals for students with disabilities, consistent with the standards and expectations for all students.

All elements of the District’s educational program – the curricula, daily learning activities, materials, textbooks, and assessments – should be aligned to support student progress toward achievement of the science standards. In accordance with their Individualized Education Programs (IEPs), students with disabilities may require accommodations, modifications, and/or supplemental aids and services in order to access the curriculum and work toward achievement of the standards. It is strongly recommended that schools explore all options to ensure equal access to, and evidence of, learning in the core curriculum for all learners – i.e., Special Education, English Language Learners (ELs), Standard English Language Learners (SELLs), Gifted and Talented Learners (GATE), etc. The goal of enabling all students to achieve a common set of standards requires equitable treatment and multiple and varied opportunities to learn.

To this end, we present the Science Instructional Guide for Middle Schools GR. 6-8 Version 2.0 which is meant to guide teachers to meet State and District expectations and requirements as well as provide guidance to meet the District commitment to provide every grade 6-8 student with the knowledge and skills necessary to excel as citizens in the evolving global community of the twenty first century. The revisions in this publication reflect an alignment with the latest State Textbook adoption and updating of relevant information that will help strengthen the grade 6-8 science program for all students.

David L. Brewer III
Superintendent of Schools

Todd Ullah
Director Secondary Science

Every LAUSD student will receive a state-of-the-art education in a safe, caring environment, and every graduate will be college-prepared and career-ready.
The State of California established the Standardized Testing and Reporting (STAR) Program to evaluate programs and determine students’ proficiency on the content standards for Language Arts, Mathematics, Science, and Social Studies. The STAR Program tests 5th Grade students with a California Standards Test (CST) in science that is aligned to the grades 4 and 5 California standards. Specific California Standards Tests are also given at the high school level for grades 9 - 11.

The STAR Program is also used by California to meet some of the requirements of the No Child Left Behind (NCLB) Act (PL 107-110), signed into law in January 2002. The Federal NCLB Legislation specifies a timeline that requires states to adopt either grade-level content standards, or grade-level content objectives aligned to benchmarked standards, in English, mathematics and science. Once these content standards or grade-level content objectives are adopted, states must phase-in assessments aligned to their adopted content standards or objectives. The NCLB science requirement specifies that by the 2007-08 school year states should give standards-aligned assessments in science at least once in the grade spans 3-5, 6-9, and 10-12. Since 2006 there is a test in Grade 8 focused on the Grade 8 content standards and a test at Grade 10 focused on the Grade 6-8 Life Science and high school Biology/Life Science standards. The 5th Grade CST is used for both the STAR Program and the NCLB requirement. The results of these assessments, as well as those in English and mathematics, are used in the states’ accountability programs as one of several indicators for schools’, districts’, and states’ Adequate Yearly Progress (AYP). Schools, districts, and states that don’t meet their AYP targets may face Federal sanctions under NCLB.

The purpose of this Instructional Guide and the District periodic assessments is to provide teachers with the support needed to ensure that students have received the science content specified by the Science Content Standards for California Public Schools, and to provide direction for instruction and/or additional resources that students may require in order for to become proficient in science at their particular grade level. This Guide is intended to be the foundation of a standards-based instructional program in science, from which the local district, school and classroom will further enrich and expand based on the local expertise and available resources.
The Role of the Instructional Guide to Support Instruction

The Instructional Guide is a foundation for the teaching of science in Grades 6-8. The guide is designed to provide support for teachers with instructional resources to assist them in their implementation of a standards-based program. The Guide is designed as a resource to support the implementation of a balanced (inquiry/text) instructional program.

This Guide should be used at the local district level as a foundation for the development of an instructional program that best utilizes the expertise and resources within that local district. In implementing this Guide, it is suggested that teachers work together to select the best combination of resources to meet their instructional goals and the specific learning needs of their students. Therefore, this Guide focuses on the efficient use of state-adopted textbooks as well as other resources found in many LAUSD schools and those available through many of the Mathematics Science Technology (MST) Centers.

The Role of this Guide is to also support the usage of periodic diagnostic assessments to ensure that students have access to the Science Content Standards for California Public Schools. Proficiency of grades K - 8 science standards will provide a strong foundation upon which the student’s High School science experience will be built.

Organization of the Science Instructional Guide

The Science Instructional Guides for grades 6 and 8 are organized into three “Instructional Components” that map out the academic year. The Instructional Guide for grade 7 is mapped into two Instructional Components. Included in each Instructional Component for grades 6, 7, and 8 are the following:

- **Standard Sets**
  The Standard Sets lay the foundation for each Instructional Component and the Periodic Assessments. The Standard Sets were determined by analyzing the California science standards for each grade level and organizing the standards into logical groups for efficient and effective teaching.

- **Content Standard Groups**
  Within each Standards Set, the standards are organized into smaller “Standards Groups” that provide a conceptual approach for teaching the standards within each Instructional Component.

- **Key Concepts**
  Key Concepts signify the “big idea” represented by each Standards Group.

- **Analyzed Standards**
  The detailed description of the content standards in the Science Framework for California Public Schools: Kindergarten Through Grade Twelve (2003) was used extensively in the development of the analyzed standards. The bulk of the standards all begin with "students know": These statements have been translated into statements of student performance that describes both the activity and the "cognitive" demand to meet those standards.
• **Instructional Resources**

  - **Sample Performance Tasks, Sample Scoring Criteria, and Some Suggested Concepts and Skills to Support Student Success** are instructional/assessment tasks aligned to one or more of the Analyzed Standards in a Standards Group. Teachers may want to adopt or adapt these Performance Tasks for use in their classroom instructional programs. Each Performance Task sets “clear expectations” for student performance and includes sample scoring criteria and some suggested concepts and skills to support student success on the task.

  - **Possible Standards-Aligned Resources**

    **Textbook References:** Standards-Aligned Resources include textbook references from the LAUSD adopted series that have been correlated with the Content Standard Group. These are provided to assist teachers in locating selections from text that align with each of the Standards Groups.

    **Sample Activities Aligned to the Standards:** Also included with the Possible Standards-Aligned Resources are activities that teachers may use for instruction for the content standard group.

LAUSD teachers have access to one of the following State adopted California textbooks series Focus on: Earth, Life, Physical Science (Glencoe 2007), and Earth, Life, Physical Science (Holt 2007), at their respective middle school. Textbook references that are aligned to the Science Content Standards for California Public Schools in each textbook series are included in the Instructional Guide.

LAUSD developed "Model Lessons", Immersion Units, and Anchor Activities as well as the Full Option Science Series (FOSS), Science Technology Concepts (STC), AIMS, Wisconsin Fast Plants, GLOBE, GEMS, Project Wet, Project Wild, Investigating Earth’s Systems (IES), and other supplemental resources are used in schools across the LAUSD and are made available through purchase or a check-out process through the District Mathematics Science Technology Centers. Although not all schools have the same instructional kits and curriculum guides, these curricula can be shared across classrooms, schools and local districts. This Guide does not intend to reflect an exhaustive analysis of these curricula, citing only those activities identified by the development teams to be substantially in alignment with the Science Content Standards.

---

**The scientist is a practical man and his are practical (i.e., practically attainable) aims. He does not seek the ultimate but the proximate. He does not speak of the last analysis but rather of the next approximation. His are not those beautiful structures so delicately designed that a single flaw may cause the collapse of the whole. The scientist builds slowly and with a gross but solid foundations, he can replace that part without damage to the remainder. On the whole he is satisfied with his work, for while science may never be wholly right it certainly is never wholly wrong; and it seems to be improving from decade to decade.**

**G.N. Lewis.** Quoted in *Stoichiometry* by Leonard K. Nash. Addison-Wesley 1966. p. vii.)
11• Immersion Units (extended science investigations)

Immersion units are extended science investigations (three weeks or more). The use of an immersion unit is an instructional strategy that brings together science, mathematics, engineering and technology learning experiences to ensure that all students engage in an extended scientific investigation at least once per year. Immersion is also a strategy for increasing participation of traditionally underserved youth in science courses with a goal of increasing enrollment in more advanced science courses. The immersion projects will provide all students with the opportunity to:

• Investigate a scientific topic in-depth over an extended period of time.
• Experience putting disparate bits of knowledge into a systematic conjecture or hypothesis.
• Gather data that tests the hypothesis.
• Confront conflicting evidence.
• Draw conclusions and reflect on those conclusions.

These immersion units are an ideal way of deepening inquiry in science, supporting personalized learning and can be used in Small Learning Community settings. These extended investigations also support culturally responsive pedagogy and all students to use both deductive and inductive reasoning to built concepts and make connections to prior experience and cultures.

• Appendix

An Appendix with District contacts and other useful information is included at the end of this Instructional Guide.

The attempt should be made...to teach science as part of the total intellectual and historical process, of which, in fact, it has always been an important part. The students should gain thereby an insight into the principles of science.... The claim of General Education is that the history is science is part of science. So are its philosophy, its great literature, and its social and intellectual context. The contribution of science instruction to the life of the university and to society should include these elements, since science includes them...

Harvard committee on general education.
Science Instructional Guide +Overview For Grades 6, 7, 8

I. Major District Initiatives
   - Secondary Literacy Plan
   - IFL Nine Principles of Learning
   - Culturally Relevant Teaching Methods to Close the Achievement Gap
   - Small Learning Communities
   - LAUSP
   - MSP-SCALE

II. State of California Document
   - The California Content Standards
   - Science Framework for California Public Schools
   - California Standards for the Teaching Profession

III. Science Pedagogy

IV. Assessment
   - Periodic Assessment
   - Scoring of Periodic Assessments
   - Unit Reflection and Intervention

Appendix
   - District Contacts and other useful information

Overarching Instructional Components
   - Review and Re-teach
   - Review results of Periodic Assessments
   - Extended Learning Interventions
   - Student/teacher reflection on student work
   - End of unit assessments
   - Use of data

Instructional Component 1
   - Standard sets (Earth, Life, and Physical Sciences)
   - Content Standard Group
   - Analyzed Standards
   - Instructional Resources:
     - Sample Performance Tasks
     - Sample Scoring Criteria
     - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
     - Possible Standards Aligned Resources

Instructional Component 2
   - Standard sets (Earth, Life, and Physical Sciences)
   - Content Standard Group
   - Analyzed Standards
   - Instructional Resources:
     - Sample Performance Tasks
     - Sample Scoring Criteria
     - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
     - Possible Standards Aligned Resources

Instructional Component 3
   - Standard sets (Earth, Life, and Physical Sciences)
   - Content Standard Group
   - Analyzed Standards
   - Instructional Resources:
     - Sample Performance Tasks
     - Sample Scoring Criteria
     - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
     - Possible Standards Aligned Resources

Science** Periodic Assessment 1
Science** Periodic Assessment 1
Science Periodic Assessment 3
California NCLB Standards Test (Grade 8)

*This Instructional Guide is designed for students in the core areas of Earth, Life, and Physical Sciences
**There will be 2 Periodic assessments for Grade 7 given each semester (Science/Health combination)
+Professional development will be designed to accompany the Instructional Guide and Assessments
I. Major District Initiatives

The Science Instructional Guide and Periodic Assessments are part of the larger District Periodic Assessment System that will support major Los Angeles Unified School District Initiatives:

A. Secondary Literacy Plan,

B. Closing the Achievement Gap: Improving Educational Outcomes for Under-Achieving Students Initiative,

C. Small Learning Communities,


A. Excerpts from the Secondary Literacy Plan

The goal of the Los Angeles Unified School District’s Secondary Literacy Plan is to enhance the District’s efforts to provide learning opportunities and instruction to enable all middle and high school students to perform rigorous work and meet or exceed content standards in each content area. The plan is designed to address student and teacher needs and overcome challenges commonly faced in middle and high school today. The purposes of the plan include the following:

• To address literacy in all content areas.
• To help secondary teachers define their role in teaching reading and writing in their content area.
• To help struggling students with basic reading and writing skills and provide differentiated support.
• To train secondary content area (including science) in the use of literacy skills and strategies to provide additional, differentiated support for students who lack basic reading and writing skills.
• To change the institutional culture and school structures of traditional middle and high schools that often isolate teachers and students and act as barriers to learning and change.

To meet the challenges of the Secondary Literacy Plan some of the following actions are to:

• Develop an instructional disciplinary literacy framework support standards-based instruction related to a specific content area.
• To communicate that content literacy addresses the development of literacy and content knowledge simultaneously.
• Organize instruction at the secondary level to create and support learning conditions that will help all students succeed.
• Implement a coherent ongoing professional development plan that will provide content area teachers with content specific knowledge and expertise to meet the varied learning and literacy needs of all students.
• Structure an organizational design (literacy cadres and coaches) that will enhance a school’s capacity to address the teaching of students with diverse learning needs. Create an infrastructure that will include instructional models to support expert teaching of content aligned to the standards.
• Differentiate instructional programs to meet the varied needs of all students, particularly those who need extensive accelerated instruction in decoding, encoding, and reading fluency.

Science is organized knowledge.

Herbert Spencer (1820-1903)
English philosopher. Education
The Division of Instructional Support Services is presently engaged in a comprehensive review of all intervention strategies and programs. The office will bring forward recommendations that will better define our intervention programs and ensure that all interventions are research-based, effective and correlated to classroom instruction. The office will identify specific interventions and recommendations for grades K through 12 including a comprehensive review of the present Summer School and Intersession programs. It is critical that as we implement standards-based instruction and we have the capacity to diagnose student weaknesses and prescribe specific interventions that will help correct those weaknesses. In accomplishing this goal, we will need to: identify in-class strategies, extended day strategies and strategies that can be implemented in Summer School and Intersession Programs. Professional Development must be provided so that all teachers are taught instructional approaches that support success for all students.

Figure 1 illustrates an overview of the Secondary Literacy Plan Components and shows the "content connections" among the disciplines of Science, English Language Arts, Mathematics, and Social Studies. The interaction of the standards, professional development, assessment and evaluation combine to form an interactive system that promotes content literacy.
B. Culturally Relevant Teaching Methods to Close the Achievement Gap

In June of 2000, the LAUSD Board of Education approved a resolution that called for an Action Plan to eliminate the disparities in educational outcomes for African American as well as other student groups. Five major tenets, along with their recommendations, performance goals, and evaluations are to be embedded into all District instructional programs. The Science Instructional Guide for Middle School Grades 6-8 supports these tenets that are:

- **Tenet 1 - Students Opportunity to Learn**

  Comprehensive professional development for administrators, teachers, counselors, and coaches on Culturally Responsive and Culturally Contextualized Teaching will ensure that instruction for African American students is relevant and responsive to their learning needs.

- **Tenet 2 - Students’ Opportunity to Learn (Adult-Focused)**

  The District will provide professional development in the Academic English Mastery Program (AEMP) to promote language acquisition and improve student achievement.

- **Tenet 3 - Professional Development for Teachers and Staff Responsible for the Education of African American Students.**

  The District will make every effort to ensure that all staff (Central, Local District, and School Site) and all external support providers are adequately trained and have the pedagogical knowledge and skill to effectively enhance the academic achievement of African American students.

- **Tenet 4 - Engage African American parents and community in education of African American students.**

  Parents should be given the opportunity and the tools to be effective educational advocates for their children. The District will continue to support the efforts of its schools to engage parents in the education of their children through improved communication among schools, teachers, and parents.

- **Tenet 5 - Ongoing planning, systematic monitoring, and reporting**

  The disparities in educational outcomes for African American as well as other students will be systemically monitored and ongoing reflection and planning will occur at all levels in the District.

Culturally Relevant and Responsive Methods for increasing achievement outcomes for African American and other underachieving students of Color.

The following are basic assumptions upon which culturally relevant and responsive instruction and learning is built.

**Basic Assumptions**

Comprehensible: Culturally Responsive Teaching teaches the whole child. Culturally Responsive teachers develop intellectual, social emotional, and political learnings by using cultural references to impart knowledge, skills, and attitudes.
Multidimensional: Culturally Responsive Teaching encompasses content, learning context, classroom climate, student-teacher relationships, instructional techniques, and performance assessments.

Empowering: Culturally Responsive Teaching enables students to be better human beings and more successful learners. Empowering translates into academic competence, personal confidence, courage, and the will to act.

Transformative: Culturally Responsive Teaching defies conventions of traditional educational practices with respect to ethnic students of color. It uses the cultures and experience of students of color as worthwhile resources for teaching and learning, recognizes the strengths of these students and enhances them further in the instructional process. Culturally Responsive Teaching transforms teachers and students. It is in the interactions with individual educators that students are either empowered or alternately, disabled - personally and academically.

Emancipatory: Culturally Responsive Teaching is liberating. It makes authentic knowledge about different ethnic groups accessible to students and the validation, information, and pride it generates are both psychologically and intellectually liberating.

The Los Angeles Unified School District is committed to the learning of every child. That commitment demands that every child has access to rich educational opportunities and supportive, personalized learning environments. That commitment demands that schools deliver a rich and rigorous academic curriculum and that students meet rigorous academic standards. Correspondingly, the large, industrial model schools typical of urban areas will be reconfigured and new schools will be built and/or organized to accommodate Small Learning Communities. These communities will be characterized by:

- Personalized instruction
- Respectful and supportive learning environments
- Focused curriculum
- Rigorous academic performance standards
- Continuity of instruction
- Continuity of student-teacher relationships
- Community-based partnerships
- Joint use of facilities
- Accountability for students, parents, and teachers
- Increased communication and collaboration
- Flexibility and innovation for students, parents, and teachers

The LAUSD is committed to the redesign of its schools. That commitment includes the willingness to treat students as individuals and the willingness to allow each school to fulfill the goals of the Small Learning Community ideals in the uniqueness of its own setting.

Science is nothing but trained and organized common sense differing from the latter only as a veteran may differ from a raw recruit: and it’s methods differ from those of common sense only as far as the guardsman’s cut and thrust differ from the manner in which a savage wields his club Thomas Henry Huxley (1825-95)


**D. The Los Angeles Urban Systemic Program (LAUSP)**

The Urban Systemic Program (USP) is a national initiative sponsored by the National Science Foundation (NSF). The grant is reviewed yearly by the NSF and sunsetsed 2004-2005. The USP was built upon the foundation of the previous LA-SI (Los Angeles Urban Systemic Initiative) Program to improve Mathematics, Science, and Technology education.

The USP was focused on enhancing the following components: standards-based curriculum, instructional methods, instructional materials, assessment, and professional development. These goals were addressed by:

- Evaluating the system’s science and mathematics infrastructure, the needs of the workforce, workforce competency and workforce capacity to deliver the curriculum.
- Aligning curriculum to be standards-based for all students.
- Providing differentiated professional development in content and pedagogy in standards-based curriculum.
- Encouraging enrollment in advanced mathematics and science courses.

**E. Mathematics, Science, Partnership Grants - System-wide Change for All Learners and Educators (S.C.A.L.E)**

The S.C.A.L.E partnership is a five year NSF grant program that brings together mathematicians, scientists, social scientists, engineers, technologists and education practitioners to build a whole new approach to enhancing mathematics and science education. The goal of S.C.A.L.E. is to improve the mathematics and science achievement of all students at all grade levels by engaging them in deep and authentic instructional experiences. One major component of the partnership is to have all students engaged in an extended (e.g., four weeks or more) scientific investigation at least once a school year.

**F. Science and Health**

The Los Angeles Board of Education has approved a policy which requires one semester of Science and one semester of health in Grade 7 and a one-semester course in health in Grades 9-12 in the senior high. Middle School students are transitioning from childhood to adulthood and need the knowledge and skills provided in health and science to be healthy, educated, successful individuals. Grade 6 Science and Health is composed of two semesters of which each semester is composed of 13 weeks of science and 6 weeks of health in a 19 week semester. Grade 7 Science is a one semester class that focuses on life science and emphasizes Cell Biology, Genetics, Evolution, Earth and Life History (Earth Science), Structure and Function in Living Systems, Physical Principles in Living Systems (Physical Science) and Investigation and Experimentation.

Grade 7 Health emphasizes Preventative Care and Behavior. Discrete facts do not change behavior; therefore, applications in both subjects are crucial to the well-being and success of our Middle School students.

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[Science is] the literature of truth.  
**Josh Billings** (Henry Wheeler Shaw) (1815-85) U.S. humorist.
The primary responsibility of the teacher is to teach his/her subject’s standards and concepts. Below are some ways that health topics could be connected and cross-referenced for students in a Grade 7 Science class. Given that science has its own standards and time restraints, the following are only suggestions. Creating your own connections to the instructional guides will strengthen student retention and provide for better understanding.

Suggestions of 7th Grade Health Concepts from the California Health Framework for Public Schools which connect and cross-reference with Grade 7 Science Topics from the Science Content Standards for California Public Schools

1. Science Topics: **CELL BIOLOGY, STRUCTURE AND FUNCTION**

   Health Topics:
   Nutrition and Food Choices, Exercise, Asthma, Respiratory System, Allergies, Drugs, Cancer, *Reproduction (Health Concepts 1, 2, 3, 7, 9)

2. Science Topic: **GENETICS**

   Health Topics:
   *Human Reproduction, Genetic Diseases, Communicable and Non-Communicable Disease, Alcoholism, Mental Illness, Nutrition/Obesity (Health Concepts 1, 2, 7, 9)

   *Human Reproduction Mandates and Requires a Parent Permission Slip

3. Science Topic: **GENETICS**

   Health Topics:
   Human Reproduction, Inheritance, Physical and Mental Diseases, Preventing and Treating Diseases (Health Concepts 1, 2, 7)

4. Science Topic: **EVOLUTION**

   Health Topics:
   Nutrition, Obesity, Exercise, Environmental Health, Family Lifestyles, Human Development and

   *Reproduction (Health Concepts 1, 2, 5, 6, 7, 8)

5. Science Topic: **STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

   Health Topics:
   Nutrition, Hygiene, *Reproduction, Diseases, Growth and Development, Body Systems (Health Concepts 1, 2, 3, 7)

6. Science Topic: **STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

   Health Topics:
   Communicable and Non-Communicable Diseases, Infection, Universal Precautions, Hygiene, Environmental Health, Immune System, Immunizations,

   Antibiotics, Medicine, Drugs (Health Concepts 1, 2, 3, 8)

7. Science Topic: **STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

   Health Topics:
   Environmental Health, Molds – with regard to Health, Skin – Athlete’s Foot, Hygiene, Malaria, Diseases (Health Concepts 1, 2, 3, 4, 9)

   Human Reproduction Mandates and Requires a Parent Permission Slip
8. Science Topics:
**CELL BIOLOGY, STRUCTURE AND FUNCTION**

Health Topics:
Nutrition, Digestion, *Reproduction (Health Concepts 1, 2, 7, 8)

9. Science Topic:
**STRUCTURE AND FUNCTION IN LIVING THINGS**

Health Topics:
Nutrition, Skeletal System, Digestive System, Circulatory System, Nervous System

(Health Concepts 1, 2, 6, 7)

10. Science Topic: **STRUCTURE AND FUNCTION IN LIVING THINGS**

Health Topics: Skeletal System, First Aid, Nutrition (Health Concept 3)

11. Science Topic: **STRUCTURE AND FUNCTION IN LIVING THINGS**

Health Topics:
Exercise & Fitness, Heart Disease, Chronic Respiratory Diseases, Nutrition (Health Concept 1, 2)

12. Science Topic:
**STRUCTURE AND FUNCTION IN LIVING THINGS**

Health Topics:
Central Nervous System, Drugs, Physical Activity, Diseases, Reproduction*, Nutrition

(Health Concepts 1, 2, 3, 9)

13. Science Topic:
**STRUCTURE AND FUNCTION IN LIVING THINGS**

Health Topics: Body Systems, Nutrition & Digestion, Communicable & Chronic Diseases, Wellness, Physical Activity, Drugs, Alcohol, Smoking (Health Concepts 1, 2, 3, 4, 6)

* Human Reproduction Mandates and Requires a Parent Permission Slip

Now, my suspicion is that the universe is not only queerer than we suppose, but queerer than we can suppose. I have read and heard many attempts at a systematic account of it, from materialism and theosophy to the Christian system or that of Kant, and I have always felt that they were much too simple. I suspect that there are more things in heaven and earth that are dreamed of, or can be dreamed of, in any philosophy. That is the reason why I have no philosophy myself, and must be my excuse for dreaming.

**John Burden Sanderson Haldane (1892-1964)**
English geneticist. Possible Worlds and other Essays (1927)
“Possible Worlds”
II. State of California Documents

The Science Instructional Guide for Middle School Grades 6-8 is built upon the framework provided by the Science Content Standards for California Public Schools©2000, the California Standards for the Teaching Profession, and the Science Framework for California Public Schools©2003. Each of these California documents has overarching implications for every grade level from Pre-K to 12.

The Science Content Standards for California Public Schools, Kindergarten through Grade 12, represents the content of science education and includes essential skills and knowledge students will need to be scientifically literate citizens in the twenty-first century. The Science Framework for California Public Schools is a blueprint for reform of the science curriculum, instruction, professional preparation and development, and instructional materials in California. The science standards contain a precise description of what to teach at specific grade levels; the framework extends those guidelines by providing the scientific background and the classroom context for teachers to use as a guide. The framework is intended to (1) organize the body of knowledge that students need to learn during their elementary and secondary school years; and (2) illuminate skills that will be used to extend that knowledge during the students’ lifetimes. These documents drive science instruction in California.

A. The California Content Standards

The California content standards are organized in each assessment period for instructional purposes and continuity of scientific concepts. They provide the foundational content that each student should achieve. Simply dividing the standards by the number of instructional days and teaching each standard discretely is neither efficient nor effective. The Framework states, "effective science programs reflect a balanced, comprehensive approach that includes the teaching of investigation and experimentation skills along with direct instruction and reading (p.11)." Teaching them in the same sequence as written also contradicts the Framework which states that "Investigation and experimentation cuts across all content areas...(p.11)"

Science is nothing but developed perception, interpreted intent, common sense rounded out and minutely articulated.

George Santayana (1863-1952)
U.S. philosopher and writer. The Life of Reason.

The standards for grade 6 and 8 are mapped into 3 assessment or instructional components. The standards for grade 7 are mapped into 2 assessment or instructional components. The teacher, student, administrator and public must understand that the standards reflect "the desired content of science curriculum..." and they "should be taught so that students have the opportunity to build connections that link science to technology and societal impacts (Science Content Standards, p. ix)." Thus, the standards are the foundation for understanding societal issues such as the environment, community health, natural resources, population and technological.
### B. Science Framework for California Public Schools

The Science Framework for California Public Schools supports the California Science Content Standards. The Framework "establishes guiding principles that define attributes of a quality science curriculum at all grade levels..." (p v-vi)

These principles of an effective science education program address the complexity of the science content and the methods by which science content is effectively taught. The guiding principles are discussed in this Instructional Guide in the section entitled: "The Role of the Instructional Guide as a Resource to Support Instruction." These principles state that effective science programs:

- Are based on standards and use standards-based instructional materials.
- Develop students’ command of the academic language of science used in the content standards.
- Reflect a balanced, comprehensive approach that includes the teaching of investigation and experimentation skills along with direct instruction and reading.
- Use multiple instructional strategies and provide students with multiple opportunities to master content standards.
- Include continual assessment of students' knowledge and understanding with appropriate adjustments being made during the academic year.

### C. California Standards for the Teaching Profession

The California Standards for the Teaching Profession provides the foundation for the teaching profession. These standards offer a common language and create a vision that enables teachers to define and develop their practice. Reflected in these standards is a critical need for all teachers to be responsive to the diverse cultural, linguistic, and socioeconomic backgrounds of their students. These standards, which take a holistic view of teaching that recognizes its complexity, are based upon expert advice and current research on the best teaching practices. The California Standards for the Teaching Profession provides a framework of six standards with thirty-two key elements that represent a developmental, holistic view of teaching, and are intended to meet the needs of diverse teachers and students. These standards are designed to help educators do the following:

- Reflect about student learning and practice;
- Formulate professional goals to improve their teaching practice and;
- Guide, monitor and assess the progress of a teacher’s practice toward professional goals and professionally accepted benchmarks.

The teaching standards are summarized below. Further expansion and explanation of the key elements are presented in the complete text, California Standards for the Teaching Profession, which can be obtained from the California Commission on Teacher Credentialing at: http://www.ctc.ca.gov/reports/cstpreport.pdf

- **Standard for Engaging and Supporting All Students in Learning**

  Teachers build on students' prior knowledge, life experience, and interests to achieve learning goals for all students. Teachers use a variety of instructional strategies and resources that respond to students’ diverse needs. Teachers facilitate challenging learning experiences for all students in environments that promote autonomy, interaction and choice.

  Teachers actively engage all students in problem solving and critical thinking within and across subject matter areas. Concepts and skills are taught in ways that encourage students to apply them in real-life contexts that make subject matter meaningful. Teachers assist all students to become self-directed learners who are able to demonstrate, articulate, and evaluate what they learn.
• Standard for Creating and Maintaining Effective Environments for Student Learning

Teachers create physical environments that engage all students in purposeful learning activities and encourage constructive interactions among students. Teachers maintain safe learning environments in which all students are treated fairly and respectfully as they assume responsibility for themselves and one another. Teachers encourage all students to participate in making decisions and in working independently and collaboratively. Expectation for student behavior are established early, clearly understood, and consistently maintained. Teachers make effective use of instructional time as they implement class procedures and routines.

• Standard for Understanding and Organizing Subject Matter for Student Understanding

Teachers exhibit strong working knowledge of subject matter and student development. Teachers organize curriculum to facilitate students’ understanding of the central themes, concepts, and skills in the subject area. Teachers interrelate ideas and information within and across curricular areas to extend students’ understanding. Teachers use their knowledge of student development, subject matter, instructional resources and teaching strategies to make subject matter accessible to all students.

• Standard for Planning Instruction and Designing Learning Experiences for All Students

Teachers plan instruction that draws on and values students’ backgrounds, prior knowledge, and interests. Teachers establish challenging learning goals for all students based on student experience, language, development, and home and school expectations, and include a repertoire of instructional strategies. Teachers use instructional activities that promote learning goals and connect with student experiences and interests. Teachers modify and adjust instructional plans according to student engagement and achievement.

• Standard for Assessing Student Learning

Teachers establish and clearly communicate learning goals for all students. Teachers collect information about student performance from a variety of sources. Teachers involve students in assessing their own learning. Teachers use information from a variety of on-going assessments to plan and adjust learning opportunities that promote academic achievement and personal growth for all students. Teachers exchange information about student learning with students, families, and support personnel in ways that improve understanding and encourage further academic progress.

• Standard for Developing as a Professional Educator

Teachers reflect on their teaching practice and actively engage in planning their professional development. Teachers establish professional learning goals, pursue opportunities to develop professional knowledge and skill, and participate in the extended professional community. Teachers learn about and work with local communities to improve their professional practice. Teachers communicate effectively with families and involve them in student learning and the school community. Teachers contribute to school activities, promote school goals and improve professional practice by working collegially with all school staff. Teachers balance professional responsibilities and maintain motivation and commitment to all students.

These Standards for the Teaching Profession along with the Content Standards and the Science Framework provide guidance for our District to achieve the objective that all students achieve a "high degree of scientific literacy."
III. Pedagogy for Science

Webster’s defines pedagogy as: "1. the function or work of the teacher; teaching, 2. the art or science of teaching; education: instructional methods.*

A. Instruction, Learning Transfer, Inquiry

By the time students enter middle school they are required to make a shift from more concrete experiential based thinking that elementary science learning focused on to more abstract hypothetical thinking required by the grades 6-8 Content and Investigation and Experimentation (I&E) Standards described in the Science Framework for California Public Schools. For instance, in grade six the I&E Standards call for students to “Develop a hypothesis" and “Construct appropriate graphs from data and develop qualitative statements about the relationships between variables." This emphasis is consistent with the increased cognitive demand in middle school mathematics: “By the end of grade seven, students are adept at manipulating numbers and equations and understand the general principles at work…They graph linear functions and understand the idea of slope and its relationship to ratio.” (Mathematics Framework for California Public Schools). By providing multiple opportunities for students to learn the science content by designing experiments, generating hypotheses, collecting and organizing data, representing data in tables and graphs, analyzing the results and communicating the findings, students are developing and applying mathematical concepts in multiple contexts. This process facilitates the development of students’ hypothetical thinking operations and provides the foundation for transfer of learning not only between mathematics and science but also to other disciplines and creates the need to use these mathematical and scientific tools in the students’ everyday lives.

In learning the science content standards in grade eight, as well as in grades six and seven, students will need multiple opportunities to “Plan and conduct a scientific investigation to test a hypothesis… Construct appropriate graphs from data and develop quantitative statements about the relationships between variables…apply simple mathematical relationships to determine a missing quantity in a mathematical expression, given the two remaining terms…Distinguish between linear and nonlinear relationships on a graph of data” as described in the Standards. Focusing instruction on the acquisition of these mathematical and scientific tools will ensure that “Students…are prepared to undertake the study of algebra… in grade eight… and will be on the pathway for success in high school science.” (Science Framework for California Public Schools)

To ensure that middle school students are prepared for the quantitative and abstract nature of high school science, there should be a continued emphasis on the inquiry-based instructional model described in the District’s Elementary Instructional Guide. This model includes many common elements or phases gleaned from the research literature on how students best learn science concepts. The research clearly points out that inquiry involves asking a question, making observations related to that question, planning an investigation, collecting relevant data, reflecting on the need to collect additional data, analyzing the data to construct plausible explanations, and then communicating findings to others.
Such a process is at the heart of the immersion units (extended inquiry) described in both the elementary and secondary instructional guides. To help teachers plan and organize their immersion and other inquiry-based units the following process can serve as a guide:

- **Phase 1.** Students are engaged by a scientific question, event, or phenomenon. A connection is made to what they already know. Questions are posed in ways that motivate students to learn more.
- **Phase 2.** Students explore ideas through direct, hands-on investigations that emphasize observation, solve problems, formulate and test explanations, and create and discuss explanations for what they have observed.
- **Phase 3.** Students analyze and interpret data they have collected, synthesize their ideas, and build concepts and new models with the support of their teacher. The interaction between teachers and students using other sources of scientific knowledge allows learners to clarify concepts and explanations that have been developed.
- **Phase 4.** Students apply their new understanding to new settings including real life situations to extend their new knowledge.
- **Phase 5.** Students, with their teacher, not only review and assess what they have learned, but also how they have learned it.

There are many factors that should be included in such instructional models to ensure the transfer of learning to new settings. One such factor that affects transfer of learning is the degree of mastery of initial learning. Initial learning is influenced by the degree to which students learn with understanding rather than memorizing a set of facts or procedures. Students must be provided with enough time for them to process information. Attempts to cover too many topics too quickly may inhibit later transfer because students only remember isolated facts or are introduced to organizing concepts they cannot grasp because they do not have enough specific information related to what they are learning.

Motivation is a factor that affects the amount of time students are willing to spend on science learning. Students who have “choice and voice” in investigations they are conducting, who engage in novel experiences, and who encounter unexpected outcomes usually develop the intrinsic motivation associated with long-term, sustainable intellectual growth that characterizes effective learning transfer. Knowing that one is contributing something meaningful to others (in cooperative groups) is particularly motivating. Learners are also motivated when they are able to see the usefulness of learning and when they can use what they have learned to do something that has an impact on others. Examples include tutoring or helping younger students learn science or participatory science nights for parents, community members and other students. Seeing real life application of what students have learned creates the so-called “Aha” response when they fit concepts learned to actual situations. Such transfer can be very motivating to students.


A crucial element of learning transfer is related to the context of learning. Knowledge or concepts that are taught in a single context are less likely to support transfer than is knowledge that is taught and experienced in multiple contexts. Students exposed to several contexts are more likely to abstract and intuit common features of experience and by so doing develop a more flexible representation of knowledge. To accomplish all of this, teachers of science2:
- Plan an inquiry-based science program for their students
- Guide and facilitate learning
- Use standards aligned texts and supplemental materials
- Engage in ongoing assessment of both their teaching and student learning
- Design and manage learning environments that provide students with the time, space, and resources needed for learning science
- Develop communities of science learners that reflect the intellectual rigor of science inquiry and the attitudes and social values conducive to science learning
- Actively participate in the ongoing planning and development of the school science program

The following chart provides a way to gauge instructional transfer by monitoring student behavior or by using possible teacher strategies. The chart is adapted with permission from BSCS (Biological Science Curriculum Study) and is intended to be used as a way to assess units of study rather than individual lessons:

<table>
<thead>
<tr>
<th>Stage of Inquiry in an Inquiry-Based Science Program</th>
<th>Possible Student Behavior</th>
<th>Possible Teacher Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage</td>
<td>Asks questions such as, Why did this happen? What do I already know about this? What can I find out about this? How can I solve this problem? Shows interest in the topic.</td>
<td>Creates interest. Generates curiosity. Raises questions and problems. Elicits responses that uncover student knowledge about the concept/topic.</td>
</tr>
<tr>
<td>Explore</td>
<td>Thinks creatively within the limits of the activity. Tests predictions and hypotheses. Forms new predictions and hypotheses. Tries alternatives to solve a problem and discusses them with others. Records observations and ideas. Suspends judgment. Tests idea</td>
<td>Encourages students to work together without direct instruction from the teacher. Observes and listens to students as they interact. Asks probing questions to redirect students' investigations when necessary. Provides time for students to puzzle through problems. Acts as a consultant for students.</td>
</tr>
<tr>
<td>Explain</td>
<td>Explains their thinking, ideas and possible solutions or answers to other students. Listens critically to other students' explanations. Questions other students' explanations. Listens to and tries to comprehend explanations offered by the teacher. Refers to previous activities. Uses recorded data in explanations.</td>
<td>Encourages students to explain concepts and definitions in their own words. Asks for justification (evidence) and clarification from students. Formally provides definitions, explanations, and new vocabulary. Uses students' previous experiences as the basis for explaining concepts.</td>
</tr>
<tr>
<td>Elaborate</td>
<td>Applies scientific concepts, labels, definitions, explanations, and skills in new, but similar situations. Uses previous information to ask questions, propose solutions, make decisions, design experiments. Draws reasonable conclusions from evidence. Records observations and explanations</td>
<td>Expects students to use vocabulary, definitions, and explanations provided previously in new context. Encourages students to apply the concepts and skills in new situations. Reminds students of alternative explanations. Refers students to alternative explanations.</td>
</tr>
<tr>
<td>Evaluate</td>
<td>Checks for understanding among peers. Answers open-ended questions by using observations, evidence, and previously accepted explanations. Demonstrates an understanding or knowledge of the concept or skill. Evaluates his or her own progress and knowledge. Asks related questions that would encourage future investigations.</td>
<td>Refers students to existing data and evidence and asks, What do you know? Why do you think...? Observes students as they apply new concepts and skills. Assesses students' knowledge and/or skills. Looks for evidence that students have changed their thinking. Allows students to assess their learning and group process skills. Asks open-ended questions such as, Why do you think...? What evidence do you have? What do you know about the problem? How would you answer the question?</td>
</tr>
</tbody>
</table>


Chart 1 - The 5 E Model (R. Bybee)
B. Principles and Domains of Culturally Relevant and Responsive Pedagogy

1. Knowledge and Experience
   a. Teachers must build their personal knowledge of cultures represented in the classroom.
   b. Teachers must identify cultural practices aligned with specific learning tasks.
   c. Teachers must engage students in instructional conversations that draw on their language competencies outside the school to serve as learning norms of reasoning within the academic subject matter.

2. Social and Emotional Elements
   a. Teachers must begin the process of becoming more caring and culturally competent by acquiring a knowledge base about ethnic and cultural diversity in education.
   b. Teachers must conduct a careful self-analysis of what they believe about the relationship among culture, ethnicity, and intellectual ability.
   c. Teachers must identify and understand attitudes and behaviors that can obstruct student achievement.

3. Equity and Equality
   a. Teachers must vary the format of instruction by incorporating multi-modality teaching that allows students to demonstrate competence in different ways.
   b. Teachers must acknowledge and accept that students can demonstrate knowledge in non-traditional ways.
   c. Teachers must build knowledge and understanding about cultural orientations related to preferred cognitive, interactive, and learning styles.

4. Quality and Rigorous Instruction
   a. Teachers must emphasize academic rigor at all times.
   b. Teachers must provide clear expectations of student’s accomplishments.
   c. Teachers must promote higher order thinking skills.

5. Instructional strategies
   a. Teachers must use cooperative learning, apprenticeship, and peer coaching strategies as instructional strategies.
   b. Teachers must provide ample opportunity for each student to read, write, and speak.
   c. Teachers must use constructivist learning approaches.
   d. Teachers must teach through active application of facts and skills by working with other students, use of computers, and other multi-media.
   e. Teachers must provide continuous feedback on students work.

6. Pedagogical Approaches
   a. Teachers must assist students to use inductive and deductive reasoning to construct meaning.
   b. Teachers must scaffold and relate students’ everyday learning to their accumulative previous academic knowledge.
   c. Teachers must modify curriculum-learning activities for diverse students.
   d. Teachers must believe that intelligence is an effort-based rather than inherited phenomenon.

7. Assessment and Diagnosis
   a. Teachers must use testing measurements for diagnostic purposes.
b. Teachers must apply periodic assessments to determine students’ progress and adjust curriculum.

c. Teachers must seek alternative approaches to fixed time tests to assess students’ progress.

d. Teachers must supplement curriculum with more multi-cultural and rigorous tests.

e. Teachers must evaluate students of different backgrounds by standards appropriate to them and their education and life experiences.

C. Disciplinary Literacy

The District initiative to advance content literacy for all students is termed “Disciplinary Literacy.” Disciplinary Literacy can be defined “as the mastery of both the core ideas and concepts and the habits of thinking” of that particular discipline. The driving idea is that “knowledge and thinking must go hand in hand.” As one grows in content knowledge, one needs to grow in the habits of thinking for that discipline. The “work or function” of the teacher is to ensure that all students learn on the diagonal. The chart below, adapted from C. Giesler, Academic Literacy (1994), illustrates the District disciplinary literacy goal for students to learn on the diagonal.

The following chart, again after Giesler, illustrates how teachers grow in their ability to teach learning on the diagonal.

For students to learn on the diagonal, it is of utmost importance for our teachers to use instructional methods that promote that learning.

Those who are not shocked when they first come across quantum mechanics cannot possibly have understood it.

Niels Henrik David Bohr
(1885-1962) Danish physicist.
Scaffolding is an instructional strategy that is contingent, collaborative, and interactive and takes place in a social context. In education, scaffolding will usually have some or all of the following features:

- **continuity** - tasks are repeated with variations and connected to each other.
- **contextual support** - a safe supportive environment encourages exploration.
- **intersubjectivity** - an environment of mutual engagement and rapport.
- **contingency** - tasks are adjusted by the actions of the learners.
- **handover/takeover** - as the learner increases in skills and confidence the facilitator allows the learner to increase their role in learning.
- **flow** - skills and challenges are in balance with learners focused and working in sync.

The table below adapted from Aida Walqui (2002) shows different scaffolding strategies to which will give students opportunities to engage in rigorous academic endeavors:

But are we of our observational facts? Scientific men are rather fond of saying pontifically that one ought to be quite sure of one’s observational facts before embarking on theory. Fortunately those who give this advice do not practice what they preach. Observation and theory get on best when they are mixed together, both helping in another in the pursuit of truth. It is a good rule not to put overmuch confidence in a theory until it has been confirmed by observation. I hope I shall not shock the experimental physicists too much if I add that it is also a good rule not to put overmuch confidence in the observational results that are put forward until that have been confirmed by theory.

**Sir Arthur Eddington** (1822-1944) English astronomer and physicist.
Scaffolding Instruction

<table>
<thead>
<tr>
<th>Modeling</th>
<th>Provide examples of the new concept for the learner to see and hear.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridging</td>
<td>Connects the new learning to prior knowledge and understanding.</td>
</tr>
<tr>
<td>Contextualizing</td>
<td>Connects the new learning to real-life situations</td>
</tr>
<tr>
<td>Text Re-Presentation</td>
<td>Changes the format of the information into another genre (i.e. a musical, a play, a song).</td>
</tr>
<tr>
<td>Schema Building</td>
<td>Provides an organization of information (i.e. graphic organizers, outlines).</td>
</tr>
<tr>
<td>Metacognitive Development</td>
<td>Provide students knowledge about and reflection on their own thinking.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1 - Some Strategies for Scaffolding</th>
</tr>
</thead>
</table>

4. Intelligence is socialized through community, class learning culture and instructional routines.
   - Students are encouraged to take risks, to seek and offer help when appropriate, to ask questions and insist on understanding the answers, to analyze and solve problems; reflect on their learning, and learn from one another.
   - Class routines build a learning culture that invites effort by treating students as smart, capable, responsible learners.
   - Teachers arrange environments, use tools, establish norms and routines, and communicate to all students how to become smarter in science.

5. Instruction is assessment-driven.
   - Teachers use multiple forms of formal and informal assessment and data to guide instruction.
   - Throughout the year, teachers assess students’ grasp of science concepts, their habits of inquiring, investigating, problem-solving, and communication.
   - Teachers use these assessments to tailor instructional opportunities to the needs of their learners.
   - Students are also engaged in self-assessment to develop metacognitive development and the ability to manage their own learning.

Science is facts; just as houses are made of stone, so is science made of facts; but a pile of stones is not a house, and a collection of facts is not necessarily science.

IV. Overview of Assessment

The District initiative to advance content literacy for all students is termed "Disciplinary Literacy." Disciplinary Literacy can be defined "as the mastery of both the core ideas and concepts and the habits of thinking" of that particular discipline. The driving idea is that "knowledge and thinking must go hand in hand." As one grows in content knowledge, one needs to grow in the habits of thinking for that discipline. The "work or function" of the teacher is to ensure that all students learn on the diagonal. The chart below, adapted from C. Giesler, Academic Literacy (1994), illustrates the District disciplinary literacy goal for students to learn on the diagonal.

A. Concepts for Assessment in Science

Instruction in our district is assessment-driven. The Framework states "that effective science programs include continual assessment of student's knowledge and understanding, with appropriate adjustments being made during the academic year (p.11)." Assessments can be on demand or over a long period of time. The chart below, adapted from A Guide for Teaching and Learning, NRC (2000), gives some examples of on demand and over time assessment.

<table>
<thead>
<tr>
<th>On Demand</th>
<th>Over Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>answering questions</td>
<td>investigations, immersion projects</td>
</tr>
<tr>
<td>multiple choice</td>
<td>research reports</td>
</tr>
<tr>
<td>true false</td>
<td>projects</td>
</tr>
<tr>
<td>matching</td>
<td>portfolios, journals</td>
</tr>
</tbody>
</table>

| constructed response, essays | lab notebooks |
| matching | |

Chart 1 - Assessment Examples

Grant Wiggins and Jay McTighe state that: "The continuum of assessment methods includes checks of understanding (such as oral questions, observations, and informal dialogues); traditional quizzes, tests, and open ended prompts; and performance tasks and projects. They vary in scope (from simple to complex), time frame (from short-term to long-term), setting (from decontextualized to authentic contexts), and structure (from highly to unstructured). Because understanding develops as a result of ongoing inquiry and rethinking, the assessment of understanding should be thought of in terms of a collection of evidence over time instead of an event-a single moment-in-time test at the end of instruction-as so often happens in current practice."

Science is the great antidote to the poison of enthusiasm and superstition.

Adam Smith (1723-90) Scottish economist. The Wealth of Nations, 1776
B. LAUSD Periodic Assessments in Science

As an integral element of the Secondary Periodic Assessment Program, the Grades 6, 7, and 8 science assessments are designed to measure teaching and learning. The intent of these Periodic Assessments is to provide teachers and the LAUSD with the diagnostic information needed to ensure that students have received instruction in the science content specified by the California Academic Content Standards, and to provide direction for instruction or additional resources that students may require in order for students to become proficient in science at their particular grade level. They are specifically designed to:

- focus classroom instruction on the California content standards;
- ensure that all students are provided access to the content in the Standards;
- provide a coherent system for connecting the assessment of content with district programs and adopted materials;
- be administered to all students on a periodic basis;
- guide instruction by providing frequent feedback that will help teachers target the specific standards-based knowledge and skills that students need to acquire;
- assist teachers in determining appropriate extensions and interventions;
- motivate students to be responsible for their own learning;
- provide useful information to parents regarding student progress toward proficiency of the standards; and
- connect professional development to standards-specific student achievement data.

Results from the Periodic Assessments should be used to specify immediate adjustments and guide modifications in instruction to assist all students in meeting or exceeding the State’s science content standards.

Each instructional module provides sample performance tasks that can be used to monitor student progress. These classroom level assessments, along with other teacher designed tests, student evaluations, and student and teacher reflections, can be used to create a complete classroom assessment plan.

Results from classroom assessments and the Periodic Assessments provide administrators, teachers and students with immediate and useful information on progress toward achievement of the standards. With results and reflection, administrators, teachers and students can make informed decisions about instruction.

At the conclusion of each Instructional Module, students will take a Periodic Assessment that will be scored electronically. These diagnostic assessments are a more formal assessment of the student’s accomplishment of the standards within the science discipline but should not be considered the sole method of assessing students’ content knowledge. The assessment is designed to measure a range of skills and knowledge.

Each Periodic Assessment will consist of multiple-choice questions and one short constructed response questions. Each assessment will be scheduled within a testing window at approximately 10-week intervals. Science test booklets will be available in both English and Spanish.

Science is what you know. Philosophy is what you don’t know.

## Proposed Calendar for Science Periodic Assessments
### Grades 6 & 8 2008-2009

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Science Periodic Deadline for Assessment Windows</th>
<th>85% of School Year for STAR Testing *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Track</td>
<td>December 12&lt;br&gt;March 20&lt;br&gt;June 3*</td>
<td>~ May 15</td>
</tr>
<tr>
<td>Year-Round (4-Track) 90/30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track A</td>
<td>November 14&lt;br&gt;April 10&lt;br&gt;June 10*</td>
<td>~ May 22</td>
</tr>
<tr>
<td>Track B</td>
<td>December 1&lt;br&gt;March 6&lt;br&gt;June 10*</td>
<td>~ May 22</td>
</tr>
<tr>
<td>Track C</td>
<td>November 14&lt;br&gt;February 13&lt;br&gt;June 10*</td>
<td>~ May 22</td>
</tr>
<tr>
<td>Track D</td>
<td>September 26&lt;br&gt;February 13&lt;br&gt;April 22*</td>
<td>~ April 3</td>
</tr>
<tr>
<td>Year-Round (3-Track) Concept 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track A</td>
<td>December 19&lt;br&gt;April 17&lt;br&gt;June 3*</td>
<td>~ May 27</td>
</tr>
<tr>
<td>Track B</td>
<td>December 19&lt;br&gt;February 13&lt;br&gt;June 3*</td>
<td>~ May 27</td>
</tr>
<tr>
<td>Track C</td>
<td>September 26&lt;br&gt;February 13&lt;br&gt;April 8</td>
<td>~ March 27</td>
</tr>
</tbody>
</table>

*The STAR testing period is traditionally a 3 week window that includes the date by which 85% of the school year has been completed. Depending on the window decided by the district, the last Periodic Assessment date may need to be adjusted.*

**Grade 7 assessment dates are 1 for each term course offered.*
## Proposed Calendar for Science Periodic Assessments
For Grade 7 2008-2009

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Science Periodic Deadline for Assessment Window</th>
<th>85% of School Year for STAR Testing +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Track</td>
<td>November 7*&lt;br&gt;May 1**</td>
<td>~ May 15</td>
</tr>
<tr>
<td>Year-Round (4-Track) 90/30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track A</td>
<td>October 31*&lt;br&gt;April 24**</td>
<td>~ May 22</td>
</tr>
<tr>
<td>Track B</td>
<td>September 5*&lt;br&gt;March 13**</td>
<td>~ May 22</td>
</tr>
<tr>
<td>Track C</td>
<td>October 31*&lt;br&gt;April 24**</td>
<td>~ May 22</td>
</tr>
<tr>
<td>Track D</td>
<td>September 5*&lt;br&gt;March 13**</td>
<td>~April 1</td>
</tr>
<tr>
<td>Year-Round (3-Track) Concept 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track A</td>
<td>November 7*&lt;br&gt;May 22**</td>
<td>~ May 27</td>
</tr>
<tr>
<td>Track B</td>
<td>November 14*&lt;br&gt;May 22**</td>
<td>~ May 26</td>
</tr>
<tr>
<td>Track C</td>
<td>September 15*&lt;br&gt;March 13**</td>
<td>~ March 29</td>
</tr>
</tbody>
</table>

*First Semester Life Science
**Second Semester Life Science
+The STAR testing period is traditionally a 3 week window that includes the date by which 85% of the school year has been completed. Depending on the window decided by the district, the last Periodic Assessment date may need to be adjusted.
C. Scoring of District Periodic Assessments

The multiple-choice sections of each periodic assessment will be scored electronically by the vendor when sent in by the teacher or school site. A short constructed response section will be scored by the teacher using a four point rubric aligned to the standards.

D. Unit Reflection, Intervention, Enhancement

Reflection and intervention is a part of daily classroom instruction and unit planning. Decisions to simply review or to incorporate research-based practices to assist students in achieving the complex tasks identified in the Science Content Standards are made each day as teachers assess student understanding. In addition, following each periodic assessment, time is set aside for reflection, intervention, and lesson planning as students and teachers review assessment scores and strategically establish a course of action before moving on to the next Instructional Component. To aid in post-assessment discussion, each teacher will receive with each form of the assessment a detailed answer key and answer rationale document that can be used for reflection and discussion of the standards.

Using the answer rationale document with the explanation of the distracters for each standards-aligned test item, teachers can discuss common misconceptions and beliefs related to each item with their students. It must be noted that at the present, 4 days are set aside for formal intervention and/or enhancement of the assessed Instructional Component. To enhance post assessment dialogue, a professional development module will be provided for each component.

E. Sample Periodic Assessment Items

Grade 6 – Assessment Set 1 (Plate Tectonics)

Standard group 1:

Standard 1a – Students know evidence of plate tectonics is derived from the fit of the continents, the location of earthquakes, volcanoes, and midocean ridges; and the distribution of fossils, rock types, and ancient climactic zones.

Which of the following evidence is used to support the theory of plate tectonics? (A)

A. The shape of coastlines, the distribution of similar fossils in geographically isolated areas, and the location of earthquakes, volcanoes and midocean ridges.
B. The shape of coastlines, the presence of extinct mammal fossils found in geographically isolated areas, and the distribution of ancient towns and cities.
C. The presence of modern plant and animal species, the types of rocks on different continents, and the coastal sea level.
D. The location of similar fossils on different continents, patterns of tidal movement, and distribution of ancient climactic zones.

The mind likes a strange idea as little as the body likes a strange protein and resists it with similar energy. It would not perhaps be too fanciful to say that a new idea is the most quickly acting antigen known to science. If we watch ourselves honestly we shall often find that we have begun to argue against a new idea even before it has been completely stated.

Wilfred Batten Lewis Trotter (1872-1939) English surgeon.
Standard 4c – Students know heat from Earth’s interior reaches the surface primarily through convection.

A.  

B.  

Which of the following diagrams correctly shows the convection currents in the mantle of the Earth? (C)

A.  

B.  

C.  

D.  

Standard group 2:

Standard 1g – Students know how to determine the epicenter of an earthquake and know that the effects of an earthquake on any region vary, depending on the size of the earthquake, the distance of the region from the epicenter, the local geology, and the type of construction in the region.

The epicenter of an earthquake is determined by ____ (A)

A. using at least three seismographs, measure the difference between when the p-waves and s-waves arrive and triangulate.

B. using no more than one seismograph, measure the amplitude of the p-waves to determine how far you are from the epicenter.

C. using at least two seismographs, measure the amplitude of the s-waves to determine how far you are from the epicenter.

D. using at least two seismographs, measure the speed of the p-waves and plot the epicenter exactly between the two recording stations.

When navigators need accurate underwater charts of coral reefs, they have teams measure the reef locations using underwater sound waves (SONAR). Why don’t navigators use photographs of the reef taken from the deck of a ship? (C)

A. Photographs cannot be used as an official navigational record.

B. Photographs cannot be taken underwater.

C. The photograph would show the reefs to be in a different place that they really are because light is reflected.

D. The depth of the water will make objects on the reef a different color.

Grade 7 – Assessment Period 1 (Cell Biology, Genetics, Structure and Function in Living Systems, Physical Principles in Living Systems, Investigation and Experimentation)

Group 2 (Cell Biology)

Standard 1b – Students know the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.

Which of the following organelles exist in plant cells, but not in animal cells? (D)

A. chloroplast and cytoskeleton

B. central vacuole and mitochondria

C. cytoskeleton and cell wall

D. cell wall and chloroplast
Group 4 (Genetics)

Standard 2e – Students know DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

Where is deoxyribonucleic acid located in a living cell that has a nucleus? (D)

A. ribosomes
B. cell wall
C. cytoplasm
D. chromosomes

Group 5 (Reproduction)

Standard 5e – Students know how bones and muscles work together to provide a structural framework for movement.

Why do physical fitness trainers recommend that a fitness program include exercises that work opposing muscle groups in a carefully coordinated effort? (A)

A. To control motion and protect joints from strong contractions.
B. To decrease flexibility and protect tendons from flexion and extension.
C. To decrease muscle mass and protect joints from compaction.
D. To alternate upper and lower body tension and flexibility.

Group 7 (Genetics)

Standard 2c – Students know an inherited trait can be determined by one or more genes.

Recently, scientists have engaged in research to map human genes in order to determine: ___ (D)

A. traits which are not expressed by genes.
B. traits which are inherited from parents and which are not.
C. genes which are inherited from parents and which are not.
D. gene or combination of genes that are responsible for a specific trait.

Which of the following would most likely result in the failure of an entire adult human system? (B)

A. a broken bone.
B. loss of total blood volume.
C. removal of the adult placenta.
D. retinal degeneration.

Group 3 (Skeletal and Muscular System)

Standard 5c – Students know how bones and muscles work together to provide a structural framework for movement.

Why do physical fitness trainers recommend that a fitness program include exercises that work opposing muscle groups in a carefully coordinated effort? (A)

A. To control motion and protect joints from strong contractions.
B. To decrease flexibility and protect tendons from flexion and extension.
C. To decrease muscle mass and protect joints from compaction.
D. To alternate upper and lower body tension and flexibility.

Group 4 (blood pressure)

Standard 6j – Students know that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.

Blood pressure in a normal healthy human is generated by ____ (D)

A. the amount of blood in the body.
B. the stress a person is under.
C. the number of valves in the heart.
D. the contractions of the heart.

Group 5 (evolution)

Standard 3e – Students know that extinction of a species occurs when the environment changes and that the adaptive characteristics of a species are insufficient for its survival.

The United States has laws to protect endangered species. How do these laws protect animals from extinction? (A)
A. It protects the organism's environment from change caused by humans.
B. It protects the organism so that it can adapt to a changing environment.
C. It tells scientists to help organisms accommodate to a changing environment.
D. It tells people where to find endangered organisms so they can be put into zoos.

Group 6 (Earth's History)
Standard 4e – Students know fossils provide evidence of how life and environmental conditions have changed.

Scientists are able to hypothesize about how the types of life and environmental conditions have changed over time by ___ (C)

A. examining the location and position of fossils in relationship to modern topography.
B. examining the location and position of fossils in relationship to continental drift theory.
C. comparing fossils with modern organisms for features that are environmentally dependent.
D. comparing fossils with modern organisms for features that are environmentally independent.

Group 7 (Evolution)
Standard 3c – Students know how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.

Scientists use which of the following processes to provide evidence for the theory of evolution? (A)

A. Radioactive dating and the identification of fossils in sedimentary rock
B. Comparative anatomy between plants and animals
C. Climate charts and maps of earthquake locations
D. Tide tables and the location of fossils

Grade 8 – Assessment Set 1 (Motion, Forces, Density and Buoyancy)

Standard group 1:

Standard 1a – Students know position is defined in relation to some choice of a standard reference point and a set of reference directions.

A student is standing -5m to the left of the origin (reference point). If the student walks 12m in a straight line toward the origin and stops, the student is now ____ (D)

A. +17 m from the origin.
B. -17 m from the origin.
C. -7 m from the origin.
D. +7 m from the origin.

Standard 1b – Students know that 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.

Marine science students on a field trip went to a beach 30 km from their school and the trip took 45 minutes. When they returned home at the end of the day, the same trip took 1 hour and 15 minutes. At times, the bus was stopped in traffic, and at other times the bus reached a speed of 60 km/hr. What was the students' average speed of travel to and from the beach? (C)

A. 15 km/hr
B. 24 km/hr
C. 30 km/hr
D. 40 km/hr

Standard 1e – Students know changes in velocity may be due to changes in speed, direction, or both.

As the International Space Station orbits the Earth, it remains approximately 250 miles above the surface at a speed of approximately 17 000 mph. What is the best way to describe its velocity? (A)

A. Its velocity is always changing because its direction is changing around the Earth.
B. Its velocity remains constant because its speed and distance remain constant.
C. Its velocity only changes when it speeds up.
D. Its velocity only changes when it slows down.

4-8
6th Grade:
Focus on Earth Science

Student Achievement
Legend
Assessment
Instructional Matrix
Instruction
District Course Name: Science and Health: 6

Thumbnail Description: Annual Course– Consists of a 13-week science module and a 6-week health module (19-week semester) to be implemented in each semester of Grade 6.

Course Code Number and Abbreviation:

36-01-01 Sci/Hlth 6A (41-26-07 Sci/Hlth 6A (Students with disabilities served in SDC)
36-01-02 Sci/Hlth 6B (41-26-08 Sci/Hlth 6B (Students with disabilities served in SDC)

Brief Course Description:

The major purpose of this course is to provide all students with standards-based science and health concepts that build upon the students' K–5 experience. Emphasis should be placed on Investigation and Experimentation and the Science Standards which will prepare students to lead successful and productive lives and prepare them for future science courses. The middle school teacher uses an balanced (inquiry/text) approach and establishes connections between the various disciplines of Earth/Space Science, Physical Science and Life Science, with a focus on Earth Science in this introductory secondary science course. 36-01-01 is to be composed of 13 weeks of science instruction and 6 weeks of health instruction. 36-01-02 is also to be composed of 13 weeks of science instruction and 6 weeks of health instruction. Teacher may choose when science or health will be taught with the understanding that they are responsible to cover the science standards in the appropriate instructional component. Inter-connections with other curricular areas should also be made.

Content of this Section:

- 6th Grade Periodic Assessments Organizer - A place for you to write down the 5 day window for your assessment.

- Science Instructional Guide Graphic Organizer Overview for 6th Grade - Provides the user with the Content Standards for the 3 Periodic Diagnostic Assessments.

- Legend Key for Matrix Chart - Provides a key that explains the Matrix Chart

- LAUSD - 6th Grade Science Matrix Chart - Contains the Content Standards, the standards grouped in Content Standard Groups, the Standards Analyzed, and Instructional Resources with Sample Performance Tasks, Sample Scoring Criteria, Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task, and Possible Standards Aligned Resources.

The dispassionate intellect, the open mind, the unprejudiced observer, exist in an exact sense only in a sort of intellectualist folk-lore; states even approaching them cannot be reached without a moral and emotional effort most of us cannot or will not make.

Wilfred Batten Lewis Trotter (1882-1939) English surgeon.
This page will serve as a reference for you. Please fill in your appropriate track periodic assessment dates. Also fill in the dates for 4 days of reflection, intervention, and enrichment following the first two periodic assessments.

<table>
<thead>
<tr>
<th>Grade 6 Periodic Assessment</th>
<th>Periodic Assessment I</th>
<th>4 day Reflection, Intervention, Enrichment</th>
<th>Periodic Assessment II</th>
<th>4 day Reflection, Intervention, Enrichment</th>
<th>Periodic Assessment III</th>
<th>Reflection, Intervention, Enrichment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Window Single Track</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment Window Three Tracks</td>
<td></td>
<td></td>
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<tr>
<td>Assessment Window Four Tracks</td>
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</tr>
</tbody>
</table>
Science Instructional Guide Graphic Organizer
Overview For Grade 6

I. Major District Initiatives
- Secondary Literacy Plan
- IFL Nine Principles of Learning
- Culturally Relevant Teaching Methods to Close the Achievement Gap
- Small Learning Communities
- LAUSP
- MSP-Scale

II. State of California Document
- The California Content Standards
- Science Framework for California Public Schools
- California Standards for the Teaching Profession

III. Science Pedagogy
- Periodic Assessment
- Scoring of Periodic Assessments
- Unit Reflection and Intervention

IV. Assessment
- Periodic Assessment
- Scoring of Periodic Assessments
- Unit Reflection and Intervention

Appendix
- District Contacts and other useful information

Overarching Instructional Components
- Review and Re-teach
- Review results of Periodic Assessments
- Extended Learning Interventions
- Student/teacher reflection on student work
- End of unit assessments
- Use of data

Instructional Component 1
Standard Set I
(1a, 1c, 1e, 1b, 3c, 4c), (1d, 1f, 3a, 1g, 2d), (7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h)
- Content Standard Group
- Analyzed Standards
- Instructional Resources:
  - Sample Performance Tasks
  - Sample Scoring Criteria
  - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
  - Possible Standards Aligned Resources

Instructional Component 2
Standard Set II
(4a, 4b, 4d, 4e, 3a, 3d), (2a, 2b, 2c, 2d), (7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h)
- Content Standard Group
- Analyzed Standards
- Instructional Resources:
  - Sample Performance Tasks
  - Sample Scoring Criteria
  - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
  - Possible Standards Aligned Resources

Instructional Component 3
Standard Set III
(5a, 5b, 5c, 5d, 5e), (6a, 6b 6c, 2d, 3b), (7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h)
- Content Standard Group
- Analyzed Standards
- Instructional Resources:
  - Sample Performance Tasks
  - Sample Scoring Criteria
  - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
  - Possible Standards Aligned Resources

Science Periodic Assessment 1

Science Periodic Assessment 2

Science Periodic Assessment 3
NOTE: The *Instructional Guide Matrix* that follows lays out an “instructional pathway” that teachers may use as a guide for teaching the Standards Set for each Instructional Component. Explanations within each box or column of the Legend on this page describe the information that a teacher will find in the boxes and columns of the matrix that follows this Legend.

### Standards for Instructional Component

The Standard Sets lays the foundation for each Instructional Component. The standards to be learned during this Instructional Component are listed numerically and alphabetically for easy reference and do not intend to suggest any order of teaching the standards.

### Content Standard Group:

The standards within each Standard Set are organized into smaller “Standard Groups” that provide a conceptual approach for teaching the standards within each Instructional Component.

### Key Concept for the Content Standard Group:** The Key Concepts signify the “big idea” represented by each Standards Group.

<table>
<thead>
<tr>
<th><strong>Content Standard Group</strong></th>
<th><strong>Analyzed Standards</strong></th>
<th><strong>Instructional Resources</strong></th>
</tr>
</thead>
</table>
| The Standards grouped here cover the Key Concept. | Analyzed Standards are a translation of the State's content standards (that begin with students know) into statements of student performance that describes both the activity and the "cognitive" demand placed on the students. The | **Sample Performance Task**

The Performance Tasks are instructional/assessment tasks aligned to one of more of the Analyzed Standards in a Standards Group. Teachers may want to adopt or adapt these Performance Tasks for use in their classroom instructional programs. Each Performance Task sets “clear expectations” for student performance, engages the students in academically rigorous learning activities, and provides opportunities for conceptual development through accountable talk if the task is done in groups. |
detailed description of the content standards in the *Science Framework for California Public Schools: Kindergarten Through Grade Twelve* (2003) was used extensively in the development of the analyzed standards.

<table>
<thead>
<tr>
<th>Sample Scoring Criteria for Performance Task</th>
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</thead>
<tbody>
<tr>
<td>Scoring criteria that teachers might use to score the sample performance task.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>These are “scaffolding” strategies that teachers might use in designing instruction that will provide students with the skills, knowledge, and conceptual understanding to perform successfully on the task.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Possible Standards Aligned Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. References from State-Adopted Textbooks</td>
</tr>
</tbody>
</table>

Textbook references from LAUSD adopted series that have been correlated with the Content Standard Group. (The standard(s) for each reference are in parenthesis before the page numbers.)

<table>
<thead>
<tr>
<th>B. Sample Activities Aligned to the Standards</th>
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</thead>
</table>
LAUSD - Sixth Grade Science Matrix Chart

Instructional Component 1 - *Plate Tectonics and Earth's Structure, Shaping Earth's Surface, Heat, Energy in the Earth System, Investigation and Experimentation: Standard Sets 1, 2, 3, 4, and 7*

<table>
<thead>
<tr>
<th>Standards for Instructional Component 1</th>
</tr>
</thead>
</table>
| **Standard Set 1 Plate Tectonics and Earth’s Structure**- Plate tectonics accounts for important features of Earth's surface and major geological events. As a basis for understanding this concept:  
  1a. Students know evidence of plate tectonics is derived from the fit of the continents, the location of earthquakes, volcanoes, and midocean ridges; and the distribution of fossils, rock types, and ancient climatic zones.  
  1b. Students know Earth is composed of several layers: a cold, brittle lithosphere; a hot, convecting mantle; and a dense, metallic core.  
  1c. Students know lithospheric plates the size of continents and oceans move at rates of centimeters per year in response to movements in the mantle.  
  1d. Students know that earthquakes are sudden motions along breaks in the crust called faults and that volcanoes and fissures are locations where magma reaches the surface.  
  1e. Students know major geologic events, such as earthquakes, volcanic eruptions, and mountain building, result from plate motions.  
  1f. Students know how to explain major features of California geology (including mountains, faults, volcanoes) in terms of plate tectonics.  
  1g. Students know how to determine the epicenter of an earthquake and know that the effects of an earthquake on any region vary, depending on the size of the earthquake, the distance of the region from the epicenter, the local geology, and the type of construction in the region. |
| **Standard Set 2: Shaping Earth’s Surface**- Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment. As a basis for understanding this concept:  
  2d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats. |
| **Standard Set 3: Heat (Thermal Energy)**- Heat moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature. As a basis for understanding this concept:  
  3. a. Students know energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects.  
  3c. Students know heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and by convection (which involves flow of matter). |
Standard Set 4: Energy in the Earth System - Many phenomena on Earth’s surface are affected by the transfer of energy through radiation and convection currents. As a basis for understanding this concept:
4c. Students know heat from Earth’s interior reaches the surface primarily through convection.

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

6th Grade Instructional Component 1 Content Standard Group 1

Standards for Component 1 Standard Group 1
1a. Students know evidence of plate tectonics is derived from the fit of the continents, the location of earthquakes, volcanoes, and midocean ridges; and the distribution of fossils, rock types, and ancient climatic zones.
1c. Students know lithospheric plates the size of continents and oceans move at rates of centimeters per year in response to movements in the mantle.
1e. Students know major geologic events, such as earthquakes, volcanic eruptions, and mountain building, result from plate motions.
1b. Students know Earth is composed of several layers: a cold, brittle lithosphere; a hot, convecting mantle; and a dense, metallic core.
3c. Students know heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and by convection (which involves flow of matter).
4c. Students know heat from Earth’s interior reaches the surface primarily through convection.
### Key Concept for Component 1 Standard Group 1: The model of the Earth’s structure reflects the dynamic changes occurring on the surface.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 1a, 1c, 1e, 1b, 3c, 4c | • Students determine how the fit of the continents, the location of earthquakes, volcanoes, and midocean ridges; and the distribution of fossils, rock types, and ancient climatic zones provide evidence of plate tectonics (1a)  
• Students explain how lithospheric plates the size of continents and oceans move at rates of centimeters per year in response to movements in the mantle. (1c)  
• Students explain how major geologic events, such as earthquakes, volcanic eruptions, and mountain building, result from plate motions. (1e)  
• Students will identify the layers of the Earth on a diagram and explain the relationship among the layers. (1b) | **Sample Performance Task**  
In groups students create a poster or electronic presentation of three geological events: earthquake, volcano and mountain range. Presentations must include:  
• Students must label and explain the type of plate movement  
• Identify the cause of the plate movement. (Demonstrate an understanding of convection cell(s) in Earth’s mantle, causing slow lithosphere plate movement which results in the following major geologic events: earthquakes, volcanic eruptions, and mountain building.)  
• Label the mantle and lithosphere (crust), include convection cell(s) in mantle and demonstrate movement. (1b, 1c, 1e, 3c, 4c, 7e, 7g) | **Sample Scoring Criteria for Performance Task**  
Student product should have the following labeled characteristics: mantle, and lithosphere in proper vertical sequence, convection cell(s) in mantle rising, moving laterally in contact with the lithosphere (crust) and then sinking, lateral crust movement, and resulting geologic events: mountain building, earthquakes, volcanic eruptions, etc.).  
**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
- Earth’s layers, convection, conduction, lithospheric (crust) plates, their movement and interactions (e.g., convergent, divergent boundaries, subduction, etc.)  
- Locations of various surface features of Earth in relation to lithospheric plate location, movement, and interaction  
- Experience using electronic presentation software and graphics, if used.  
- Authentic photographs of world regions |  
| Possible ResourcesAligned to Standards | A. References from State-Adopted Textbooks |
**Students**

- compare/contrast conduction (which involves no flow of matter) and conduction and by convection (which involves flow of matter). (3c)
- Students explain how heat from Earth's interior reaches the surface primarily through convection. (4c)

**Glencoe**

- (1a, 7e) pp. 166-173, 186-187
- (1c) pp. 183-189
- (1e) pp. 215-220, 221, 249-251, 295-299
- (1b) pp. 102-105, 108
- (3c) pp. 145-149
- (4c) pp. 106-108, 188-190

**Holt**

- (1a) pp. 193-194, 196, 208-209, 232, 266
- (1c) pp. 198-199 202-203
- (1b) pp. 85, 190-192
- (3c) pp. 90, 92-94, 100-102, 441, 476-477
- (4c) pp. 100-101

**B. Sample Activities Aligned to the Standards**

*Exploring Earth Plate Tectonics 6th grade Immersion Unit*

**Glencoe Activities**

- (1a) Drifting Continents, p. 172
- (1e) The Ring of Fire, pp. 320-321
- (1b) Earth’s Layers, pp. 110-111

**Holt Activities**

- (1a, 1d, 1e, 7f) Locating Earth’s Volcanoes, p. 282
- (1e) Continental Collisions, p. 189
- (3c, 4c) Modeling Convection, p. 102
- (3c) Stop the Energy Transfer, pp. 112 -113

**LAUSD Anchor Activities**

- (1a) Planet ZEB – Are the Continents Drifting?
- (1a, 1b, 1c) Plate Time Machine
- (1b, 1c) Layers of the Earth: A Scale Model
- (4c) Heating the Earth
### Grade 6 Instructional Component 1 Content Standard Group 2

**Standards for Component 1 Standard Group 2**

1d. Students know that earthquakes are sudden motions along breaks in the crust called faults and that volcanoes and fissures are locations where magma reaches the surface.

1f. Students know how to explain major features of California geology (including mountains, faults, volcanoes) in terms of plate tectonics.

3a. Students know energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects.

1g. Students know how to determine the epicenter of an earthquake and know that the effects of an earthquake on any region vary, depending on the size of the earthquake, the distance of the region from the epicenter, the local geology, and the type of construction in the region.

2d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.

**Key Concept for Component 1 Standard Group 2:** Earthquakes occur and volcanoes erupt because of factors below the Earth's surface.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 1d, 1f, 3a, 1g, 2d     | • Students explain the causes of earthquakes and volcanoes. (1d)  
                       • Students explain major features of California | **Sample Performance Task**  
Student describes how to locate an earthquake epicenter, and then locates an earthquake epicenter on a map. Using P and S wave data and a P and S wave time-travel graph available in their textbook, student determines the distances from the epicenter of an earthquake to three different seismograph stations in three different cities. Student uses... |
geology (including mountains, faults, volcanoes) in terms of plate tectonics. (1f)
• Students explain the mechanism of energy transfer. (3a)
• Students determine the epicenter of an earthquake and explain how the effects of the earthquake depend on several variables. (1g)
• Students evaluate the effects of earthquakes, volcanic eruptions, landslides, and floods on human and wildlife habitats. (2d)

these distances to generate scale distances, using the scale given in the map in the textbook. Using these scale distances as radii, student draws three circles on the map from the textbook; with each city in the center of a circle, and the radius of the circle is the scale distance to the epicenter. The three circles intersect at the location of the epicenter. Write a description of the epicenter location. (1g, 7b, 7c, 7d, 7f) Note: standard 1g also includes earthquake effects and building structure, soil type, etc. that would require an additional performance task to demonstrate mastery of the entire standard)

Sample Scoring Criteria for Performance Task
Student product should have a description of the procedure used to obtain and process data, data table with data and distance interpolation, calculation results for P-S wave lag time (if necessary), accurately drawn circles that intersect at the epicenter of the earthquake, and a written identification of the epicenter location.

Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task
• Earthquake characteristics; epicenter, P and S waves, seismographs and seismograms
• Scale modeling, compass use, and map reading skills

Possible Resources Aligned to Standards
A. References from State-Adopted Textbooks
Glencoe
(1d) pp. 246-247, 294-299, 304-305
(1f) pp. 223-226, 307
(3a) pp. 131-134
(1g) pp. 253-258, 263-267, 270, 271, 276, 279
(2d) pp. 270-275, 313-315
Holt
(1d) pp. 204-207, 232-235, 266, 270-274, 276
(1f) pp. 210-216
(3a) pp. 92-96, 235, 474, 476
(1g) pp. 236-247
<table>
<thead>
<tr>
<th>Sample Activities Aligned to the Standards</th>
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<tbody>
<tr>
<td><strong>Glencoe Activities</strong></td>
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<tr>
<td>(1d) How Do Volcanoes Form, p. 300</td>
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<tr>
<td>(1g) Can You Locate An Earthquakes Epicenter?, pp. 268-269</td>
</tr>
<tr>
<td>(1g) Can You Locate Areas at Risk for an Earthquake?, p. 279</td>
</tr>
<tr>
<td>(2d) Preparing For an Earthquake, pp. 280-281</td>
</tr>
<tr>
<td>(2d) How Does Lava Affect Habitats, p. 318</td>
</tr>
<tr>
<td><strong>Holt Activities</strong></td>
</tr>
<tr>
<td>(1d) Modeling Strike Slip Faults, p. 207</td>
</tr>
<tr>
<td>(1d) Modeling an Explosive Eruption, p. 275</td>
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<tr>
<td>(1f) Modeling Accretion, p. 213</td>
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<tr>
<td>(3a) Heat Transfer, p. 95</td>
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<tr>
<td>(3a) Seismic Spring Toys, p. 236</td>
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<tr>
<td>(1g, 7b) Investigating Building Materials, p. 231</td>
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<tr>
<td>(1g) Locating an Epicenter, p. 239</td>
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<tr>
<td>(1g) Earthquake Epicenters, p. 252</td>
</tr>
<tr>
<td>(1g) Earthquakes and Buildings, p. 246</td>
</tr>
<tr>
<td>(2d) Modeling a Tsunami, p. 250</td>
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</tbody>
</table>

| **Catastrophic Events STC Kit (CE)**      |
| (1c, 1e, 1a, 1f, 7e, 7g) CE15.1 Using a Simple Model of Plate Movement |
| (1a, 1c, 1f, 1e, 7e, 7g) CE 15.2 Using the Moving Plates Model |
| (4c, 1c, 3c, 7e) CE 16.3 Modeling Convection in the Mantle |
| (1a, 1e, 7f, 7b) CE 13.1 Plotting Earthquakes to Identify Patterns |
| (1c, 1e, 1a, 1f, 7e, 7g) CE 15.1 Using a Simple Model of Plate Movement |
| (1a, 1c, 1f, 1e, 7e, 7g) CE 15.2 Using the Moving Plates Model |
| (1f, 1a, 1e, 7a-e) CE 19.1 Investigating Magma and New Landforms |
| (1f, 1a, 1e, 7a-e) CE 19.2 Investigating Lava and New Landforms |
| (1d, 7a-e) CE 15.2 Investigating faults with Models |
| (1c, 1e, 1a, 1f, 7e, 7g) CE 15.1 Using a Simple Model of Plate Movement |
| (1a, 1c, 1f, 1e, 7e, 7g) CE 15.2 Using the Moving Plates Model |
| (1f, 1a, 1e, 7a-e) CE 19.1 Investigating Magma and New Landforms |
| (1f, 1a, 1e, 7a-e) CE 19.2 Investigating Lava and New Landforms |
| (1e, 1f, 7a-e) CE 20.1 Investigating Viscosity and Volcano Type |
| (2d, 1g, 7b) CE 11.2 Designing and building an Earthquake Resistant House |
| (1g, 7b) CE 12.1 Recording Vibrations |
| (1g, 7b, 7c) CE 12.2 Reading a Seismogram |
| (1g, 7b, 7c, 7e, 7g) CE 12.3 Locating the Epicenter of an Earthquake |
| (2d) CE 10.1 Thinking about Earthquakes |
| (2d, 1g, 7b) CE 11.2 Designing and building an Earthquake Resistant House |
| (2d, 7h) CE 18.1 Thinking about Volcanoes |
| (2d, 7e) CE 23.1 Investigating Properties of Volcanic Ash |
| (2d, 7e, 7c) CE 24.1 Investigating Ash Fall |
| (3a, 7e, 7d) CE 12.3 |
| (3a, 7b, 7d) CE 11.1 Testing the Motion of Waves |
LAUSD - Sixth Grade Science Matrix Chart

Instructional Component 2 - Shaping Earth's Surface, Heat, Energy in the Earth System, Investigation and Experimentation:
Standard Sets 2, 3, 4, and 7

<table>
<thead>
<tr>
<th>Standards for Instructional Component 2</th>
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</table>
| **Standard Set 2: Shaping Earth's Surface** - Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment. As a basis for understanding this concept:
  2a. Students know water running downhill is the dominant process in shaping the landscape, including California’s landscape.
  2b. Students know rivers and streams are dynamic systems that erode, transport sediment, change course, and flood their banks in natural and recurring patterns.
  2c. Students know beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves.
  2d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.

| **Standard Set 3: Heat** - Heat moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature. As a basis for understanding this concept:
  3a. Students know energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects.
  3c. Students know heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and by convection (which involves flow of matter).
  3d. Students know heat energy is also transferred between objects by radiation (radiation can travel through space).

| **Standard Set 4: Energy in the Earth System** - Many phenomena on Earth’s surface are affected by the transfer of energy through radiation and convection currents. As a basis for understanding this concept:
  4b. Students know solar energy reaches Earth through radiation, mostly in the form of visible light.
  4d. Students know convection currents distribute heat in the atmosphere and oceans.
  4e. Students know differences in pressure, heat, air movement, and humidity result in changes of weather.

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

### Grade 6 Instructional Component 2 Content Standard Group 1

**Standards for Component 2 Standard Group 1:**

4a. Students know the sun is the major source of energy for phenomena on Earth’s surface; it powers winds, ocean currents, and the water cycle. [Framework: p 95]
4b. *Students know* solar energy reaches Earth through radiation, mostly in the form of visible light. [Framework: p 95]
4d. *Students know* convection currents distribute heat in the atmosphere and oceans. [Framework: p 96]
4e. Students know differences in pressure, heat, air movement, and humidity result in changes of weather.
3a. *Students know* energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects. [Framework: p 92]
3d. *Students know* heat energy is also transferred between objects by radiation (radiation can travel through space). [Framework: p 94]

**Key Concept for Component 2 Standard Group 1:** The dynamic systems on Earth are affected by the Sun's energy.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 4a, 4b, 4d, 4e 3a, 3d  | • Students identify the sun as the major source of energy for phenomena on Earth’s surface (the phenomena being the winds, ocean currents and the water cycle) (4a)  
• Students explain how solar energy reaches the | **Sample Performance Task**  
Student makes a labeled diagram of a convection current in a weather system (e.g., afternoon onshore local wind at a beach) that includes the role of the Sun in heating the surface of the Earth, and the transfer of heat by conduction from the land surface to the lower atmosphere. Also include the upward movement of warmed air within the system, the cooling of the air as it reaches the upper atmosphere and transfers heat to the surrounding air, the subsequent downward movement of cooled air over the ocean, and the horizontal onshore wind movement from over the sea to over the land. Include explanation that demonstrates student understanding of the above, and includes use of academic vocabulary. (4a, 4d, 4e, 7e, 7g) |
| Earth through radiation, mostly in the form of visible light. (4b) | Sample Scoring Criteria for Performance Task
| Students apply prior knowledge of convection (from Standard 4c) as it applies to the heat distribution in the atmosphere and oceans. (4d) | Student product should depict solar radiation striking the Earth’s land surface, the transfer of heat by conduction from Earth’s surface to the air at the surface, the upward movement of warmed air, the cooling of air in the upper atmosphere, the downward movement of cooled air, and the horizontal movement of air from the sea to the land. |
| Students differentiate the different components of weather and analyze their interactions that result in changes in weather. (4e) | Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task
| Students analyze how energy is transferred in different forms. (3a) | • The role of radiation from the Sun in heating the Earth, and the transfer of heat by conduction and convection
| Students differentiate between the forms of heat energy transfers, radiation, convection and conduction. (3d) | • The structure of a local wind system, or other convective weather systems used for the diagram (e.g., hurricane, global wind system, thunderstorm, etc.)
| Sample Scoring Criteria for Performance Task | • Students should have an opportunity to observe a convection current (e.g., a glass pan of water, with food color dropped in, and heated below one end of the pan)
| Possible Resources Aligned to Standards | • Creation of a word bank/wall for ELL learners.
| A. References from State-Adopted Textbooks | Possible Resources Aligned to Standards
| Glencoe | A. References from State-Adopted Textbooks
| (3a) pp., 131-134, 142 | Glencoe
| (3d) pp. 150, 397-398 | (3a) pp., 131-134, 142
| (4a) pp. 388-389, 401-403, 430-432, 472-474 | (3d) pp. 150, 397-398
| (4d) pp. 394-395, 401-409, 430-437 | (4b) pp. 384-387,
| Holt | (4e) pp. 401-409, 468-474, 475-482, 483-488, 490-496, 498-501
### B. Sample Activities Aligned to the Standards

**Glencoe Activities**
- (4b) Why is the Sky Blue?, p. 391
- Pg 395 How do Clouds Form? (4d)
- Pg 433 Different Densities (4d)
- Pg 497 How do the Santa Ana Winds Move (4e)

**LAUSD Earth Science Model Lesson: Convection Connections**

**Holt Activities**
- Pg. 365(lab) Sun & Water Cycle (4a)
- Pg. 83(lab) Heat Transfer by Radiation (4b)
- Pg. 435 (lab) Ups & Downs of Convection (4d)
- Pg. 456-457(lab) Modeling the Coriolis Effect (4d)
- Pg. 534-535 (lab) Convection Currents (4d)
- Pg. 492-493(lab) Under Pressure (4c)
- Pg. 505 (lab) Meeting of Air Masses (4e)

**LAUSD Anchor Activities:**
- (3a, 3c, 3d) How Heat Travels

**STC Catastrophic Events Kit**
- 3.1 Differential Heating and Cooling of soil and water (4b, 4a, 3d, 7a-e)
- 4.1 Investigating Temperature of air (3d 7a-e)
- 4.2 Investigating How Warm Air and Cool Air Move (4a, 7a-e)
- 5.1 Investigating Effects of Colliding Air Masses (4d, 4e, 7a-e)
- 6.1 Observing Evaporation and Condensation (4a, 7a, 7d)
- 6.2 Modeling the effects of air pressure on cloud formation (4e, 7a, 7d)
- 6.3 Reading Weather Maps (4e, 7f, 7b)
- 7.1 Investigating Effect of Temperature on Ocean Currents (4a, 4d, 7a-e)
- 7.2 Investigating Surface Currents, (4a, 4d, 7f)
## Grade 6 Instructional Component 2 Content Standard Group 2

### Standards for Component 2 Standard Group 2:

2a. Students know water running downhill is the dominant process in shaping the landscape, including California's landscape.

2b. Students know rivers and streams are dynamic systems that erode, transport sediment, change course, and flood their banks in natural and recurring patterns.

2c. Students know beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves.

2d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.

### Key Concept for Component 2 Standard Group 2:

Human populations are affected by flooding, earthquakes and volcanoes.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 2a, 2b, 2c, 2d         | • Students identify that water running downhill is the dominant process in shaping California’s landscape. (2a)  
                        | • Students explain how beaches are formed. (2b)  
                        | • Students analyze rivers and streams systems that erode, transport sediment, change course and flood, thereby determining their patterns. (2c)  
                        | • Students evaluate the damages caused by earthquakes, volcanic eruptions, landslides | **Sample Performance Task**  
Student, using a lab tray with a layer of fine sand or clay in the bottom as a stream table, creates a small streambed with a small volume of water in a measured amount of time. After measuring the width of the resulting streambed and noting the amount of sediment at the bottom end of the stream, student makes a labeled drawing of the streambed. Student then hypothesizes how a larger volume of water (in the same amount of time as the first flow) would change the streambed. Student next uses a larger volume of water to flood the streambed, overflowing the banks. Student measures the width of the resulting changed streambed, makes a labeled drawing of it, and writes an illustrated explanation of how water flow can change a streambed. Be sure to include two labeled (e.g., “First stream, width, amount of water used”, etc.) illustrations of the two streams, and written descriptions of what the two streambeds were like and how they are different from each other. Include observations of the relative amount of sediment at the bottom end of the stream flows. Include a discussion of how running water changes landscapes (e.g., creates valleys, sandbars, lower mountains, etc.) Student presents findings to class. (2a, 2b, 7a, 7d, 7e, 7g) |

**Sample Scoring Criteria for Performance Task**  
Student product has two labeled (e.g., “First stream, width, amount of water used”, etc.)
and floods and how they change human wildlife habitats. (2d)

illustrations of the two streams, and written descriptions of what the two streambeds were like and how they are different from each other. Include observations of the relative amount of sediment at the bottom end of the stream flows. Include discussion of how running water changes landscapes.

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**
- Relevant geological formations and terms (mountains, valleys, sediment, etc.)
- Measuring with a ruler
- Teacher should give explicit instructions for components of written explanation.

**Possible Resources Aligned to Standards**

**A. References from State-Adopted Textbooks**

<table>
<thead>
<tr>
<th>Glencoe</th>
<th>(2a) pp. 80-84, 334-335, 339-341, 349, 352</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(2b) pp. 341-353, 359-361</td>
</tr>
<tr>
<td></td>
<td>(2c) pp .349-350, 360, 438-444</td>
</tr>
<tr>
<td></td>
<td>(2d) pp. 342-344, 480-481</td>
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</tbody>
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<tbody>
<tr>
<td></td>
<td>(2b) pp. 330-337, 368-377, 388-391</td>
</tr>
<tr>
<td></td>
<td>(2c) pp. 304-30, 332-338</td>
</tr>
<tr>
<td></td>
<td>(2d) pp 246-251, 256-259, 278-281, 286-289, 348-351, 376-390,</td>
</tr>
</tbody>
</table>

**B. Sample Activities Aligned to the Standards**

<table>
<thead>
<tr>
<th>Glencoe Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2b) Will it Slump or Will it Creep?, p. 362</td>
</tr>
<tr>
<td>(2c) Isn’t All Sand the Same?, p. 443</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Holt Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2a) Weathering, p. 306</td>
</tr>
<tr>
<td>(2c) Beach Erosion, pp. 352-352</td>
</tr>
</tbody>
</table>
LAUSD - Sixth Grade Science Matrix Chart

Instructional Component 3 - Ecology, Resources, Shaping Earth's Surface, Heat, Investigation and Experimentation:
Standard Sets 5, 6, 2, 3, and 7

<table>
<thead>
<tr>
<th>Standards for Instructional Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Set 5: Ecology</strong>- Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. As a basis for understanding this concept:</td>
</tr>
<tr>
<td>5a. Students know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs.</td>
</tr>
<tr>
<td>5b. Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment.</td>
</tr>
<tr>
<td>5c. Students know populations of organisms can be categorized by the functions they serve in an ecosystem.</td>
</tr>
<tr>
<td>5d. Students know different kinds of organisms may play similar ecological roles in similar biomes.</td>
</tr>
<tr>
<td>5e. Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.</td>
</tr>
<tr>
<td><strong>Standard Set 6: Resources</strong>- Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. As a basis for understanding this concept:</td>
</tr>
<tr>
<td>6a. Students know the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.</td>
</tr>
<tr>
<td>6b. Students know different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and know how to classify them as renewable or nonrenewable.</td>
</tr>
<tr>
<td>6c. Students know the natural origin of the materials used to make common objects.</td>
</tr>
<tr>
<td><strong>Standard Set 2: Shaping Earth's Surface</strong>- Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment. As a basis for understanding this concept:</td>
</tr>
<tr>
<td>2d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.</td>
</tr>
<tr>
<td><strong>Standard Set 3: Heat</strong>- Heat moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature. As a basis for understanding this concept:</td>
</tr>
<tr>
<td>b. Students know that when fuel is consumed, most of the energy released becomes heat energy.</td>
</tr>
</tbody>
</table>
| **Standard Set 7: 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:
7a. Develop a hypothesis.
7b. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
7c. Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
7d. Communicate the steps and results from an investigation in written reports and oral presentations.
7e. Recognize whether evidence is consistent with a proposed explanation.
7f. Read a topographic map and a geologic map for evidence provided on the maps and construct and interpret a simple scale map.
7g. Interpret events by sequence and time from natural phenomena (e.g., the relative ages of rocks and intrusions).
7h. Identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hillslope).

Grade 6 Instructional Component 3 Content Standard Group 1

Standards for Component 3 Standard Group 1:
5a. Students know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs.
5b. Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment.
5c. Students know populations Students demonstrate a conceptual understanding of population and ecosystems, such as the roles of producers, consumers, and decomposers in a food web: and the effects of resources and energy transfer on populations by creating a food pyramid.
5d. Students know different kinds of organisms may play similar ecological roles in similar biomes.
5e. Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

Key Concept for Component 3 Standard Group 1: Energy and matter is exchanged in an ecosystem.

<table>
<thead>
<tr>
<th>Standard Groups</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 5a, 5b, 5c, 5d, 5e | Students map the energy entering ecosystems as sunlight is transferred by producers into chemical | Sample Performance Task
Given a list of organisms in an ecosystem, student designs an ecosystem display (PowerPoint, diorama, poster, etc.) that depicts the ecological relationships that transfer energy and matter from organisms to other organisms in the ecosystem. Descriptions of |
energy through photosynthesis and then from organism to organism through food webs. (5a)

- Students illustrate how matter is transferred over time from one organism to others in the food web and between organisms and the physical environment. (5b)
- Students classify populations of organisms by the functions they serve in the ecosystem. (5c)
- Students compare and contrast different kinds of organisms and the similar ecological roles they play in similar biomes. (5d)
- Students explain the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range temperatures, and soil composition. (5e)

organisms should include the name of the organism, indicate their trophic level (producer, primary, secondary, tertiary consumer, decomposer) along with other appropriate descriptors (e.g., omnivore, carnivore, herbivore). Be sure to include at least one producer, one primary consumer, one secondary consumer, one top-level carnivore (tertiary consumer), and one decomposer. Students present ecosystem displays to the class, and class classifies organisms from each other's displays into similar ecological roles, from different ecosystems. (5a, 5b, 5c, 5d)

**Sample Scoring Criteria for Performance Task**

Items on the display should include appropriate organisms in the following categories: a photosynthetic plant or cyanobacterium (producer) that uses sunlight for its energy, a primary consumer (herbivore or omnivore) animal or protist that eats the plant for its energy, a secondary consumer (carnivore or omnivore) that eats the primary consumer for its energy, a tertiary consumer (top-level predator) that eats the secondary consumer for its energy, and a decomposer (fungus or moneran) that eats the top predator for its energy.

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**

- Food chains, webs, and roles within them, and energy pyramids

**Possible Resources Aligned to Standards**

_A. References from State-Adopted Textbooks_

**Glencoe**

(5a,b,c,d) pp. 552-565
(5b) pp. 568-572
(5d) pp. 536-537
(5e) pp. 516-522, 538-539 lab

**Holt**

(5a) 554-556, 592-593
(5b) 554-557, 558-560, 562-563
B. Sample Activities Aligned to the Standards

Glencoe Activities
(5e) Counting Populations, pp. 538-539
(5c) Can you classify animals by diet?, pp. 557
(5b) What do they eat if they live that biome?, pp. 564
(5a, b, c) Is it primary, secondary, or tertiary?, pp 574-575

Holt Activities
(5b) Who Eats Whom?, p. 549
(5b, 5e) How are the Organisms in a Food Chain Connected?, p. 558
(5c) How to Categorize Organisms, p. 598
(5c) Pond-Food Relationships, p. 601
(7e) Organizing and Analyzing Evidence, p. 606

LAUSD Anchor Activities
(5a, 5b, 5c,5e) Food Chain Simulation

Grade 6 Instructional Component 3 Content Standard Group 2

<table>
<thead>
<tr>
<th>Standards for Component 3 Standard Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6a. Students know the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.</td>
</tr>
<tr>
<td>6b. Students know different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and know how to classify them as renewable or nonrenewable.</td>
</tr>
<tr>
<td>6c. Students know the natural origin of the materials used to make common objects.</td>
</tr>
<tr>
<td>2d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.</td>
</tr>
<tr>
<td>3b. Students know that when fuel is consumed, most of the energy released becomes heat energy.</td>
</tr>
</tbody>
</table>

**Key Concept for Component 3 Standard Group 2:** Renewable and nonrenewable are resources important to the economy of California.
<table>
<thead>
<tr>
<th>Content Standard Groups</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 6a, 6b, 6c, 2d, 3b     | • Students evaluate the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process. (6a)  
• Students classify different natural energy and material resources including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests as renewable or nonrenewable. (6b)  
• Students identify the natural origin of the materials used to make common objects. (6c)  
• Students evaluate damages caused by earthquakes, volcanic eruptions, landslides, and floods and how they change human and wildlife habitats. (2d)  
• Students understand that when fuel is consumed, most of the energy released | **Sample Performance Task**  
Student will collaborate to research and write a presentation that proposes and defends an alternative source of energy that could be developed and used by Californians to help avoid another state energy crisis as happened in 2002. The presentation should discuss the origin, production, and use of the alternative energy resource, the consequences of its production and use, and an explanation of why it is renewable or nonrenewable. (6a, 6b, 7a)  

**Sample Scoring Criteria for Performance Task**  
Presentation should have an accurate description of the origin of the energy source, a complete and plausible sequence of events describing the production and use of the energy source, the monetary and non monetary consequences of its production and use, and an explanation of why it is renewable or nonrenewable.  

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
• Current main sources of energy used in California, their origin, production, and use  
• Compare and contrast Renewable versus nonrenewable energy sources using a T chart.  
• How to find information sources about alternative energy resources  
• How to research, organize, write, and edit a presentation (for example: power point, scientific demonstration, poster presentation, etc.) according to the teacher’s specifications  

**Possible Resources Aligned to Standards**  
A. References from State-Adopted Textbooks  
Glencoe  
(6a) pp. 595-617  
(6b) pp. 588-605  
(6c) pp. 588-589, 607-608 |
becomes heat energy. (3b)  

| Holt | (2d) pp. 313-315, 270-271  
|      | (3b) p. 564  
|      | (2d) pp. 279, 518, 513  
|      | (3b) pp. 158, 531  
|      | (6b) pp. 128-133, 138, 158-162, 164, 166-169, 170-172, 314, 382, 412-414, 531  
|      | (6c) pp. 134, 136-143, 415  

B. Sample Activities Aligned to the Standards  

Glencoe Activities  
(6a) How can you make the sun work for you?, p. 606  
(6a, 6b) Energy Usage-Applying Math, p. 615  
(6a) Become an energy expert, pp. 616-617  

Holt Activities  
(6b, 6c) Natural Resources Used at Lunch, p. 144  
(7c) Constructing Graphs from Data, p. 176  

Web Activities  
Energy Webquest- [www.energyquest.ca.gov](http://www.energyquest.ca.gov)  
Exploring Earth: Plate Tectonics

Image courtesy NASA

6th Grade Earth Science

Immersion Unit

This draft document is the result of several months of writing and discussion as part of the SCALE Math and Science Partnership. It is a living document open to change based on feedback from pilot testing and input. It is intended to be circulated for consultation to the SCALE community and other interested parties. A final version will be made available near the end of the SCALE project in 2007. To check on the latest version or to offer comments/suggestions, please contact your Local District Science Personnel or MST Center Science Personnel.
Exploring Earth: Plate Tectonics

This Grade 6 Immersion Unit is being developed in partnership with the Los Angeles Unified School District and is being tested and revised by teachers, scientists, and curriculum developers associated with the NSF-funded Math/Science Partnership, System-wide Change for All Learners and Educators (SCALE) and the DOE-funded Quality Educator Development (QED) project at the California State University – Dominguez Hills.

Immersion Units provide a coherent series of lessons designed to guide students in developing deep conceptual understanding that is aligned with the standards and key concepts in science. In Immersion Units, students learn academic content by working like scientists: making observations, asking questions, doing further investigations to explore and explain natural phenomena, and communicating their results based on evidence.

The preparation of this report was supported by a grant from the National Science Foundation to the University of Wisconsin–Madison (EHR 0227016). At UW–Madison, the SCALE project is housed at the Wisconsin Center for Education Research. The other partners are the University of Pittsburgh, where the SCALE project is housed within the Learning Research and Development Center’s Institute for Learning; California State University at Dominguez Hills and Northridge; Los Angeles Unified School District; Denver Public School District; Providence Public School District; and Madison Metropolitan School District. Any opinions, findings, or conclusions are those of the author and do not necessarily reflect the view of the supporting agency.
A view of Earth from space is a familiar sight, thanks to photographs taken by Apollo astronauts. As familiar as it is, this is just a snapshot in Earth’s long history. Earth is an active planet, changing visibly in the course of our lifetime and changing enormously in the course of geologic time.

This unit provides students with the opportunity to discover, test, and use one of the most fundamental principles in Earth Science, the theory of plate tectonics. This relatively recent idea was presented with convincing evidence in the mid-twentieth century. It has proven to be a powerful tool in understanding the changing features of Earth’s surface, the generation and disappearance of rock on the ocean floors, and catastrophic events such as earthquakes and volcanic eruptions. It is an area of vigorous ongoing research.

Exploring Earth: Plate Tectonics focuses on the overarching question: How does the theory of Plate Tectonics explain the movement and structure of Earth’s surface?

This Immersion Unit offers an in-depth, student directed investigation. Students use knowledge and evidence they gain through guided inquiry steps to design, build, evaluate, and revise a physical model that accurately explains the tectonic processes responsible for the landforms in a particular world region.

Nine regions are featured in this unit to give both a local and world view of plate tectonics. The unit is designed to challenge students to build and repeatedly evaluate and refine a physical model for an assigned region. To do this, students engage in the unit’s lessons about the structure and processes that shape Earth’s surface, then use what they learn to revise their model.

The unit begins with dramatic images of changes to Earth’s surface resulting from earthquakes, volcanic eruptions, and tsunamis to remind students of evidence that Earth’s surface is dynamic. Students plot seismic data for the location and timing of these events, look for patterns, and find that they occur along plate boundaries. Students then analyze GPS data to discover that Earth’s surface changes not only during sudden events but also moves slowly all the time. They learn of the existence of major plates and make connections back to patterns they described during the seismic data plotting exercise. Moving into a geologic time frame, students examine the fit of continents and distribution of fossil data to explain how the surface has changed as plates move over long periods of time.

Next, students are guided to learn about Earth’s inner structure and how it relates to tectonic processes. Students are challenged to consider what makes up the interior of Earth. Activities and readings provide content knowledge and scientific skills for understanding the layers of Earth and convection currents that result in plate movement.

Unit Key Concepts

- Plate tectonics explains the landforms, changing features, and catastrophic events of Earth’s surface.
- Major geological features of California, including mountains and locations of earthquakes and volcanoes, can be explained using plate tectonics.
Then, students use evidence from the age of rocks relative to seafloor spreading centers to discover an important concept: Rock is recycled from spreading centers to subduction zones. Students also learn that volcanic activity is often found at subduction zones. Throughout the guided inquiry steps, students capture the key concepts in their science notebooks and apply this knowledge to the evaluation and modification of their regional models.

Finally, students present their models and explanations for tectonic processes responsible for the landforms in their assigned region. From those examples, students then analyze two California features, the Sierra Nevada mountain range and the San Andreas Fault, and use evidence from the region models to explain their formation and behavior, respectively. In this unit, students move from regional to world views to look for patterns and then apply their understanding to develop explanations for prominent local geologic features.

<table>
<thead>
<tr>
<th>Unit Standards</th>
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</thead>
<tbody>
<tr>
<td>This Immersion Unit supports the following California science content standards:</td>
</tr>
</tbody>
</table>

### Plate Tectonics and Earth’s Structure
1. Plate tectonics accounts for important features of Earth’s surface and major geologic events. As a basis for understanding this concept:
   a. Students know evidence of plate tectonics is derived from the fit of the continents; the location of earthquakes, volcanoes, and midocean ridges; and the distribution of fossils, rock types, and ancient climatic zones.
   b. Students know Earth is composed of several layers: a cold, brittle lithosphere; a hot, convecting mantle; and a dense, metallic core.
   c. Students know lithospheric plates the size of continents and oceans move at rates of centimeters per year in response to movements in the mantle.
   d. Students know that earthquakes are sudden motions along breaks in the crust called faults and that volcanoes and fissures are locations where magma reaches the surface.
   e. Students know major geologic events, such as earthquakes, volcanic eruptions, and mountain building, result from plate motions.
   f. Students know how to explain major features of California geology (including mountains, faults, volcanoes) in terms of plate tectonics.
   g. Students know how to determine the epicenter of an earthquake and know that the effects of an earthquake on any region vary, depending on the size of the earthquake, the distance of the region from the epicenter, the local geology, and the type of construction in the region.

### Shaping Earth’s Surface
2d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.

### Heat (Thermal Energy) (Physical Science)
3c. Students know heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and by convection (which involves flow of matter).

### Energy in the Earth System
4c. Students know heat from Earth’s interior reaches the surface primarily through convection.

### Investigation and Experimentation
7. 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...
### Unit Standards (continued)

Students will:

a. 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 hill slope).

### Unit Timeline

<table>
<thead>
<tr>
<th>Step</th>
<th>Lesson</th>
<th>Time</th>
<th>Key Concepts</th>
</tr>
</thead>
</table>
| Step 1   | Earth-Shattering Events     | 45 min | • Earthquakes and volcanic eruptions provide evidence that Earth’s surface changes.  
  • Earthquakes and volcanic eruptions are sudden, local events but may affect large areas.  
  • Changes to Earth’s surface are sometimes caused by secondary events such as tsunamis. |
| Step 2   | Examining Earth’s Surface   | 45 min | • Regions of the world have diverse landforms—we can learn about them by studying maps and photographs and making observations.  
  • Scientific models are based on evidence.                                                        |
|          | Begin Modeling Investigation| 45 min | • Scientific models are based on evidence.                                     |
| Step 3   | Exploring Seismic Waves     | 40 min | • Scientists use seismometers to study seismic waves which are produced by earthquakes.  
  • *Magnitude* refers to the absolute size of an earthquake whereas *intensity* is a relative value and depends on an observer’s location. |
|          | Analyzing Seismic Data      | 45 min | • Earthquakes and volcanic eruptions do not occur in random places, but in a pattern near specific locations  
  • Volcanic eruptions often occur in regions that also have earthquakes.                           |
<p>|          | Revising Regional Models    | 30 min | • Scientists revise their models and explanations based on new information.     |</p>
<table>
<thead>
<tr>
<th>Step</th>
<th>Lesson</th>
<th>Time</th>
<th>Key Concepts</th>
</tr>
</thead>
</table>
| Step 4 | Tracking Slow Movements—GPS | 30 min | • The surface of Earth moves slowly and continuously, not just during catastrophic events.  
• GPS provides direct observation of slow surface movement.  
• Different areas of Earth’s surface move in different directions. |
| | Discovering Plates | 40 min | • Areas moving as a unit are outlined in a pattern similar to the location of earthquakes and volcanoes.  
• Scientists have discovered that Earth’s surface is broken into large segments, called plates, that move slowly and continuously. |
| | Revising Regional Models | 20 min | • Scientists revise their models and explanations based on new information. |
| Step 5 | Geologic Time | 50 min | • Continents used to be in different positions compared to present-day.  
• The shapes of the continents and the locations of fossils are two important pieces of evidence that contribute to plate tectonics. |
| | The Earth’s Crust | 35 min | • Plates are sections of Earth’s outer layer, the crust. |
| | Inside Earth | 35 min | • Earthquakes occur along fractures in the crust called faults.  
• The Earth’s interior is made of layers with different properties.  
• Convection currents beneath Earth’s surface cause plates to move. |
| | Revising Regional Models | 20 min | • Scientists revise their models based on new evidence. |
| Step 6 | Divergent Plate Boundaries | 40 min | • New rocks form at mid-ocean ridges and displace older rocks. |
| | Evidence for subduction | 45 min | • Subduction occurs where an oceanic plate converges with a continental plate. |
| | Revising Regional Models | 20 min | • Scientists revise their models based on new evidence. |
| Step 7 | Unit Evaluate Part I: Model Showcase | 50 min | • Plate tectonics explains the landforms, changing features and catastrophic events of Earth’s surface.  
• Major features of California geology (including mountains, faults, and volcanoes) can be understood in terms of plate tectonics. |
| | Unit Evaluate Part II: Explaining Mountains | 50 min |  |
| | Unit Evaluate Part III: California on the Move | 50 min |  |
Unit Investigation, Scientific Modeling, and Science Notebooks

The Unit Investigation is a student-directed inquiry to meet this challenge: How can you explain land formations and processes that formed them in one region of the world using a physical model?

Students develop a model for the surface structures, plates, plate interactions, and Earth’s layers in a particular region of the world. They develop the model in cycles, changing it as lessons in the unit reveal evidence for new concepts. For each version of the model, students report their rationale, the ideas they want to convey and their evidence. In the end, the class shares the models as students collect observations and look for global patterns of plate behavior.

What students build in this investigation is more than a display. A physical model is a tool in the scientific process of asking questions, using evidence to test ideas, and modifying explanations. Students will go through several cycles of collecting evidence, forming ideas, and building a model to communicate their ideas. The initial model will be simple, mostly showing only surface features. As students gain knowledge about plate tectonics, they re-evaluate their model and modify it to reflect how those features came about. The design plan and the legend displayed with each version of the model are your clues to check for conceptual understanding.

The student’s ability to state the strengths and limitations of a model are as important as the model itself.

What is a scientific model and why use one in teaching?

Models are often thought of as static, prefabricated, physical representations of some structure, such as the human heart or the solar system. However, there are many types of models, and they are important scientific tools. Scientists use evidence to design and use models for specific processes. Models provide a way to work out relationships that may not be feasible through direct observations. Models can be static or dynamic, physical, or mathematical.

As students learn how scientists think and work, it is useful for them to share the experience of model design and construction. In this unit, the model’s development is used to support students in developing an understanding of the often abstract concepts associated with tectonic processes and Earth’s structure. As students have the chance to use evidence to evaluate and modify their models, they interact with these concepts by applying them to a real region of the world that they are modeling.

Students’ models may or may not have moving parts to represent the tectonic movements when they are introduced. While the type of model that moves in response to changing conditions would allow students to pose interesting questions about the model’s accuracy, it may not be feasible to develop with the time and materials available. Instead, students are guided in this unit to include a legend and written explanation with each model revision to show their understanding of the dynamic processes. In this way, the model provides a concrete example for students to interact with and apply their understanding of new evidence to as it is introduced throughout the unit.

How will you help students achieve success with the investigation?

The key to success with the model inquiry in this unit is to allow the model to begin simple and change over time to become more complex. The first model will likely show only surface features like mountain ranges and valleys. Then, as students learn about plate boundaries, they can revise the models to include where those are located in their region. Similarly, when they learn about Earth’s structure, they can include cross-section information that explains how convection currents cause the plates in their region to move.

Allow students to make choices in model construction that may require significant revision when additional evidence is learned. Prompt students to ask questions of their model: Does it...
accurately explain the evidence for Earth’s surface features and processes in that region? If so, how? If not, what are some limitations to the model?

The cycle of learning about new evidence for landform development and then inquiring if the model accounts for the new evidence is repeated as students develop a rich understanding of plate tectonics. This continues in parallel with the guided inquiry. Eventually, students develop scientifically-oriented explanations for the patterns of plate behavior around the world. In this way, students have time to acquire and use this content knowledge in-depth as they improve their critical thinking skills.

Science Notebooks
One way that scientists keep a record of their observations, data, explanations, and ideas is by recording them in a notebook. The use of science notebooks for each student is strongly encouraged for this unit. Where appropriate, directions are given in the implementation guide to include the use of science notebooks in various activities. Science notebooks can serve not only as an organizing tool, but also as a valuable source of formative feedback throughout the unit.

Unit Formative and Summative Assessment
Discussion questions are included as a wrap-up for each lesson. They are referred to as the “REAP Questions.” REAP refers to the verbs recall, extend, analyze, and predict—representing four different cognitive levels of understanding. The REAP discussion appears at the bottom of the Snapshot page. These questions can be used in a think-pair-share discussion format, as questions you pose to small groups, or as individually written reflections.

Recall questions are designed to assess students’ recollection of basic facts related to the lesson’s concepts. Extend and analyze questions provide opportunities to formatively assess students’ understanding of the key lesson concepts. A predict question is provided for the teacher to learn about students’ prior conceptions about the concepts in lessons that follow and pique students’ interest in what is to come.

The worksheets included in the lessons also provide many opportunities for assessment as the students work through the key concepts of the unit. The worksheets should be collected, reviewed, and used as benchmarks for student understanding.

The main summative and performance assessment piece of this unit occurs when students present all the regional models. They first record their observations during a presentation of the models. Then, students use evidence from the key tectonic patterns represented by the regional models to explain the formation and behavior of two California features, the Sierra Nevada Range and the San Andreas Fault, respectively.
7th Grade:
Focus on Life Science

Student Achievement
Legend
Assessment
Instructional Matrix
Instruction

7-1
A. Introduction to the 7th Grade Science Section

**District Course Name:** Science 7

**Thumbnail Description:**
Semester Course—Grade 7, No Prerequisite

**Course Code Number and Abbreviation:**
36-01-03 Science 7 (41-36-09 Sci 7 (Students with disabilities served in SDC)

**Brief Course Description:**
The major purpose of this course is to provide all students with science concepts and ideas that build upon the students’ K–6 experience. Emphasis should be placed on Investigation and Experimentation and the Science Standards which will prepare students to lead successful and productive lives and prepare them for future science courses. The middle school teacher uses an balanced (inquiry/text) approach and establishes connections between the various disciplines of Earth/Space Science, Physical Science and Life Science, with a focus on Life Science in this introductory secondary science course. Inter-connections with other curricular areas are also made. This is a one semester course with the other semester to be health.

**Content of this Section:**
- 7th Grade Periodic Assessments Organizer - A place for you to write down the 5 day window for your assessment.
- Science Instructional Guide Graphic Organizer Overview for 7th Grade - Provides the user with the Content Standards for the 2 Periodic Diagnostic Assessments.
- Legend Key for Matrix Chart - Provides a key that explains the Matrix Chart.
- LAUSD - 7th Grade Science Matrix Chart - Contains the Content Standards, the standards grouped in Content Standard Groups, the Standards Analyzed, and Instructional Resources with Sample Performance Tasks, Sample Scoring Criteria, Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task, and Possible Standards Aligned Resources.

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I believe there is no philosophical high-road in science, with epistemological signposts. No, we are in a jungle and find our way by trial and error, building our road behind us as we proceed.

# 7th Grade

## Periodic Assessments Organizer

This page will serve as a reference for you. Please fill in your appropriate track periodic assessment dates. Also fill in the dates for 4 days of reflection, intervention, and enrichment following the first periodic assessments.

<table>
<thead>
<tr>
<th>Grade 7 Periodic Assessment</th>
<th>Periodic Assessment I</th>
<th>4 day Reflection, Intervention, Enrichment</th>
<th>Periodic Assessment II</th>
<th>Reflection, Intervention, Enrichment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Window Single Track</td>
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<tr>
<td>Assessment Window Three Tracks</td>
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<tr>
<td>Assessment Window Four Tracks</td>
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</tr>
</tbody>
</table>
Science Instructional Guide Graphic Organizer

Overview For Grade 7

I. Major District Initiatives
  - Secondary Literacy Plan
  - IFL Nine Principles of Learning
  - Culturally Relevant Teaching Methods to Close the Achievement Gap
  - Small Learning Communities
  - LAUSP
  - MSP-Scale

II. State of California Document
  - The California Content Standards
  - Science Framework for California Public Schools
  - California Standards for the Teaching Profession

III. Science Pedagogy

IV. Assessment
  - Periodic Assessment
  - Scoring of Periodic Assessments
  - Unit Reflection and Intervention

Appendix
  - District Contacts and other useful information

Instructional Component 1
Standard Set I
(6a, 6c, 6d, 6f, 6g), (6d, 1a, 1b, 1c, 1f), (1d), (1e, 2e), (5d, 5e, 2b), (2a, 5f, 2b), (2c, 2d), (7a, 7b, 7c, 7d, 7e)
- Content Standard Group
- Analyzed Standard
- Instructional Resources:
  - Sample Performance Tasks
  - Sample Scoring Criteria
  - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
  - Possible Standards Aligned Resources

Instructional Component 2
Standard Set II
(5a, 5b), (5g, 6c, 6b), (6h, 5c, 6i), (6j), (3a, 3e, 3b, 4f), (4e, 4g, 4b), (4e, 4a, 4d, 3e, 3d), (7a, 7b, 7c, 7d, 7e)
- Content Standard Group
- Analyzed Standard
- Instructional Resources:
  - Sample Performance Tasks
  - Sample Scoring Criteria
  - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
  - Possible Standards Aligned Resources

Overarching Instructional Components
  - Review and Re-teach
  - Review results of Periodic Assessments
  - Extended Learning Interventions
  - Student/teacher reflection on student work
  - End of unit assessments
  - Use of data
NOTE: The *Instructional Guide Matrix* that follows lays out an “instructional pathway” that teachers may use as a guide for teaching the Standards Set for each Instructional Component. Explanations within each box or column of the Legend on this page describe the information that a teacher will find in the boxes and columns of the matrix that follows this Legend.

### Standards for Instructional Component

The Standard Sets lay the foundation for each Instructional Component. The standards to be learned during this Instructional Component are listed numerically and alphabetically for easy reference and do not intend to suggest any order of teaching the standards.

### Content Standard Group:

The standards within each Standard Set are organized into smaller “Standard Groups” that provide a conceptual approach for teaching the standards within each Instructional Component.

**Key Concept for the Content Standard Group:** The Key Concept signifies the “big idea” represented by each Standards Group.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| The Standards grouped here cover the Key Concept. | Analyzed Standards are a translation of the State's content standards (that begin with students know) into statements of student performance that describes both the activity and the "cognitive" demand placed on the students. The | **Sample Performance Task**  
The Performance Tasks are instructional/assessment tasks aligned to one of more of the Analyzed Standards in a Standards Group. Teachers may want to adopt or adapt these Performance Tasks for use in their classroom instructional programs. Each Performance Task sets “clear expectations” for student performance, engages the students in academically rigorous learning activities, and provides opportunities for conceptual development through accountable talk if the task is done in groups. |
detailed description of the content standards in the *Science Framework for California Public Schools: Kindergarten Through Grade Twelve* (2003) was used extensively in the development of the analyzed standards.

| Sample Scoring Criteria for Performance Task |
| Scoring criteria that teachers might use to score the sample performance task. |

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**

These are “scaffolding” strategies that teachers might use in designing instruction that will provide students with the skills, knowledge, and conceptual understanding to perform successfully on the task.

**Possible Standards Aligned Resources**

A. References from State-Adopted Textbooks

Textbook references from LAUSD adopted series that have been correlated with the Content Standard Group. (The standard(s) for each reference are in parenthesis before the page numbers.)

B. Sample Activities Aligned to the Standards
Standards for Instructional Component 1

Standard Set 1: Cell Biology - All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope. As a basis for understanding this concept:
1a. Students know cells function similarly in all living organisms.
1b. Students know the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
1c. Students know the nucleus is the repository for genetic information in plant and animal cells.
1d. Students know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.
1e. Students know cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.
1f. Students know that as multicellular organisms develop, their cells differentiate.

Standard Set 2: Genetics - A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept:
2a. Students know the differences between the life cycles and reproduction methods of sexual and asexual organisms.
2b. Students know sexual reproduction produces offspring that inherit half their genes from each parent.
2c. Students know an inherited trait can be determined by one or more genes.
2d. Students know plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
2e. Students know DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

Standard Set 5: Structure and Function in Living Systems (Note Parent permission is necessary to teach these standards, they might be addressed in Health) - The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. As a basis for understanding this concept:
*5d. Students know how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.
*5e. Students know the function of the umbilicus and placenta during pregnancy.
5f. Students know the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.
Standard Set 6: Physical Principles in Living Systems - Physical principles underlie biological structures and functions. As a basis for understanding this concept:
6a. Students know visible light is a small band within a very broad electromagnetic spectrum.
6c. Students know light travels in straight lines if the medium it travels through does not change.
6d. Students know how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.
6f. Students know light can be reflected, refracted, transmitted, and absorbed by matter.
6g. Students know the angle of reflection of a light beam is equal to the angle of incidence.

Standard Set 7: 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:
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.
7b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
7c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
7d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g. motion of Earth’s plates and cell structure).
7e. Communicate the steps and results from an investigation in written reports and oral presentations.

Grade 7 Instructional Component 1 Content Standard Group 1

Standards for Component 1 Standard Group 1:
6a. Students know visible light is a small band within a very broad electromagnetic spectrum.
6c. Students know light travels in straight lines if the medium it travels through does not change.
6d. Students know how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.
6f. Students know light can be reflected, refracted, transmitted, and absorbed by matter.
6g. Students know the angle of reflection of a light beam is equal to the angle of incidence.

Key Concept for the Component 1 Standard Group 1: The properties of light explain how images are perceived as light moves through
different media and into the eye.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 6a, 6c, 6d, 6f, 6g      | • Students differentiate the components of the electromagnetic spectrum. (6a)  
• Students analyze the pathways light travels through one or more media. (6c)  
• Students categorize how light interacts with different types of media. (6f)  
• Students determine the angle of reflection based on the angle of incidence. (6g) | **Sample Performance Task**  
In cooperative groups students will construct labeled diagrams of light traveling through at least 3 media of their choice showing the reflected, refracted and transmitted light and the angle incidence. Media may include air, water, lens, prisms and optical instruments. Students will include written explanations for each diagram using the proper academic language. (6a, 6c, 6g, I&E 7a, 7b, 7c)  
**Sample Scoring Criteria for Performance Task**  
Students diagrams should include accurately labeled diagrams that clearly and correctly demonstrate how light interacts with each of their chosen media using the proper academic language. The written explanation should include an accurate description of how light travels through each of the chosen media.  
**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
• diagrams showing light reflecting and refracting through convex and concave lenses  
• light behavior through different media such as air, glass, water  
• diagrams showing how instruments such as a pinhole camera, microscope and telescope work |

**Possible Standards Aligned Resources**  
A. *References from State-Adopted Textbooks*  
Glencoe  
(6a) 430-431, 432, 434  
(6c) 428, 438-439,  
(6d) 443-444, 446, 447, 40-452, 456  
(6f) 440-441, 435-437, 438, 433-445, 451, 452  
(6g) 440-441
B. Sample Activities Aligned to the Standards

Glencoe Activities
(6c, 6e) Why does the pencil look broken?, p. 438
(6d) How does the image change?, p. 444

Holt Activities
(6c, 6g) Reflecting Mirror, p. 83
(6c, 6f) Refracting Water, p. 92

LAUSD Anchor Activities
(6a) Marker Chromatograph
(6a, 6b, 6c, 6e) Pinhole Viewer

Web Activities
http://dev.physicslab.org/
www.light-science.com/reflectorexper.html

Grade 7 Instructional Component 1 Content Standard Group 2

Standards for Component 1 Standard Group 2:
6d. Students know how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.
1a. Students know cells function similarly in all living organisms.
1b. Students know the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
1c. Students know the nucleus is the repository for genetic information in plant and animal cells.
1f. Students know that as multi-cellular organisms develop, their cells differentiate.

Key Concept for Component 1 Standard Group 2: The development of lenses and microscopes led to the discovery of cells and their
functions.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 6d, 1a, 1b, 1c, 1f    | • Students correlate the structure of a lens with its function. (6d) | **Sample Performance Task**  
In partner pairs students will create a Venn Diagram, using proper academic language to compare characteristics of plant cells to animal cells. Students should make sure that the characteristics that are held in common are in the shared space and that those that are unique are in the proper outer areas of the Venn Diagram. (1b, I&E 7d)  
**Sample Scoring Criteria for Performance Task**  
A proficient response should include the following (from the CA Framework):  
Plant cell outer area of Venn Diagram: chloroplast, large central vacuole, cell wall determines shape of cell.  
Animal cell outer area of Venn Diagram: cytoskeleton determines shape of cell.  
Shared area of Venn Diagram: cell membrane, nucleus, mitochondria, and cytoplasm.  
**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
• plant cell parts from CA Framework  
• animal cell parts from CA Framework  
• Venn Diagram usage |  
|                        | • Students explain the effect of using multiple lenses. (6a) |  
|                        | • Students differentiate between plant and animal cells. (1b) |  
|                        | • Students identify nuclei in prepared slides. (1c) |  
|                        | • Students explain the function of nucleus. (1c) |  
|                        | • Students explain that the genetic material for the cell is found in the nucleus in both plants and animals. (1c) |  
|                        | **Possible Standards Aligned Resources**  
A. References from State-Adopted Textbooks  
Glencoe  
(6d) pp. 443-445, 450-453, 456  
(1b) pp. 58-60  
(1c) p. 60  
(1f) pp. 100-106 |
<table>
<thead>
<tr>
<th>Activity</th>
<th>Holt</th>
<th>Glencoe Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students construct a timeline of the development of a multi-cellular organism that reflect cell differentiation. (1f)</td>
<td>(1a) pp. 51 lab, 52-60, 113-130, 212-217, 338-342</td>
<td>(6d) Can a Cow Teach You about your Eyes, p. 458-459</td>
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<td>(1b) pp. 120-122, 124-126, 148-151, 147 lab, 360-361, 396-397</td>
<td>(6d) Brain Pop Movie, “The Eye”</td>
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<td></td>
<td>(1c) pp. 117-119, 122, 126, 134-135 lab,</td>
<td>(6d) Real World Science, p. 469-461</td>
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<tr>
<td></td>
<td>(1f) pp. 128-133, 113 lab, 425-427, 448-449, 467-470, 563-567</td>
<td>(6d, 1b) Launch Lab, p. 45</td>
</tr>
<tr>
<td>Students compare different types of cells in a multi-cellular organism. (1f)</td>
<td>(1a) How can you observe DNA in the Cell, p. 54</td>
<td>(1a) How can you observe DNA in the Cell, p. 54</td>
</tr>
<tr>
<td>Students diagram the various levels of organization in a multi-cellular organism. (1f)</td>
<td>(1a) Cellular Similarity, p. 51</td>
<td>(1a) How can you observe DNA in the Cell, p. 54</td>
</tr>
<tr>
<td></td>
<td>(1b) What are Plants Made of?, p. 113</td>
<td>(1b) What are Plants Made of?, p. 113</td>
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<tr>
<td></td>
<td>(1b) Observing Cells, p. 115</td>
<td>(1b) Observing Cells, p. 115</td>
</tr>
<tr>
<td></td>
<td>(1b) Reading Strategy (comparison table of Plant vs. Animal cells), p. 120</td>
<td>(1b) Reading Strategy (comparison table of Plant vs. Animal cells), p. 120</td>
</tr>
<tr>
<td></td>
<td>(1b) Quick Lab: Cell Diagrams, p. 121</td>
<td>(1b) Quick Lab: Cell Diagrams, p. 121</td>
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<td></td>
<td>(1b) Internet Activity: Cell World, p. 125</td>
<td>(1b) Internet Activity: Cell World, p. 125</td>
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<tr>
<td></td>
<td>(1b) Cells Alive Lab, p. 134</td>
<td>(1b) Cells Alive Lab, p. 134</td>
</tr>
<tr>
<td><strong>LAUSD/S.C.A.L.E. Immersion Unit</strong></td>
<td><strong>LAUSD Anchor Activities</strong></td>
<td><strong>Web Activities</strong></td>
</tr>
<tr>
<td>(1c, 7a-e) Fast plants</td>
<td>(1a, 1b, 1c, 1d, 7d) Cell and Cell Parts</td>
<td><a href="http://www.cellsalive.com/cells/animcell.htm">http://www.cellsalive.com/cells/animcell.htm</a></td>
</tr>
<tr>
<td></td>
<td>(1a, 1b, 1c, 1d, 1e, 1f, 5a, 7d) Under the Microscope, The Unseen World, What Lies in the Eye? Cow Eye Dissection</td>
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</tbody>
</table>
Microscope Activities
(7a, 7c, 7d) Explore with magnifying glass and microscope:
• Prepared slides
• Red Onion
• Goldfish tails
• Prepared slides of root cells

Grade 7 Instructional Component 1 Content Standard Group 3

Standard for Component 1 Content Standard Group 3:
1d. Students know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.

Key Concept for Component 1 Content Standard Group 3: Chloroplasts capture solar energy in the form of glucose that is used by mitochondria to liberate energy for the work that cells do.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 1d                     | Students compare how plants and animals obtain and use energy. (1d) | **Sample Performance Task**
|                        | Students diagram the relationship between photosynthesis and respiration. (1d) | Students will illustrate a picture book/poster or present a skit to explain how energy available for most organisms is obtained from the energy captured by plants from sunlight. Describe the processes of photosynthesis and respiration and the relationship between photosynthesis and respiration, simple chemical equations, labeled pictures including the functions of mitochondria and chloroplasts. Be sure to explain the proper sequence of events in all pictures and labeled diagrams starting with energy from the sun. Information should be gathered from a variety of print and Internet resources. (1d, I&E 7b, 7d) |
|                        | **Sample Scoring Criteria for Performance Task** | A proficient response should include the following (from the CA Framework):
|                        | Role of chloroplasts (include discussion of pigment) in photosynthesis to capture energy from sunlight; simple correct chemical formulae: chemical energy transfer from plants to animals; role of mitochondria in respiration in liberating energy for work in cells |
Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task

- ways in which plants and animals obtain energy
- parts of a chemical equation – reactants and products
- chemical equations for respiration and photosynthesis
- flow-charts of energy transfer to plants and to animals

Possible Standards Aligned Resources

A. References from State-Adopted Textbooks

Glencoe
(1d) 61, 68-71

Holt
(1d) pp. 124-126, 148-151, 147 lab, 360, 396-399, 410-411 lab

B. Sample Activities Aligned to the Standards

Glencoe Activities
(1d) Yeast Cell Respiration, p.70

Holt Activities
(1d) The purpose of pigment, p. 147
(1d) Currency of the Cell, p. 149

Web Activities
http://chem.lapeer.org/Bio1Docs/PhotoLab.html 1d
http://www.bio.net/bionet/mm/plant-ed/2006-July/008059.html (several photosynthesis labs) 1d
http://departments.oxy.edu/tops/Photosynthesis/PHOTOSYN2-S.pdf
http://labsdatabase.benttreepress.com/dbContent/labs/Biology/JN07-005.pdf  Go to page 7
http://www.johnkyrk.com/photosynthesisdark.html A true computer simulation
http://highered.mcgraw-hill.com/sites/0072437316/student_view0/chapter10/animations.html#
# Grade 7 Instructional Component 1 Content Standard Group 4

<table>
<thead>
<tr>
<th>Standards for Component 1 Standard Group 4:</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 1e. Students know cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.  
2e. Students know DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell. | Sample Performance Task  
Students will create a mobile/flipbook/story board/foldable or poster including captions using the academic language showing the stages of mitosis. The product should begin with the parent cell and show all the in-between stages leading up to the two resulting daughter cells. Appropriate labels and explanations of each of these stages of the mitotic division should be documented and included. (1e, 2e, I&E: 7d, 7e)  

Sample Scoring Criteria for Performance Task  
A proficient product should contain the following: models or illustrations representing each step in mitosis; a clear sequence of events leading from mother cell to the two daughter cells; detailed explanations of each of these stages. |
| Key Concept for Component 1 Standard Group 4: |  |
| The process of mitosis passes DNA, the genetic material, to every new cell in an organism. |  |

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
</tr>
</thead>
</table>
| 1e, 2e | Students illustrate the sequence of events in the process of mitosis. (1e)  
Students construct a model of DNA. (2e) |

**Sample Performance Task**

Students will create a mobile/flipbook/story board/foldable or poster including captions using the academic language showing the stages of mitosis. The product should begin with the parent cell and show all the in-between stages leading up to the two resulting daughter cells. Appropriate labels and explanations of each of these stages of the mitotic division should be documented and included. (1e, 2e, I&E: 7d, 7e)

**Sample Scoring Criteria for Performance Task**

A proficient product should contain the following: models or illustrations representing each step in mitosis; a clear sequence of events leading from mother cell to the two daughter cells; detailed explanations of each of these stages.

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**

- mitosis stages and descriptions of stages
- construct a simple mobile
- graph the cell cycle
- research mitosis from standards-aligned resources
- graph bacterial growth through textbook or cut-and-paste activity
- view time-lapse sequence of mitosis to observe chromosome segregation via internet, DVD, VHS, or other media source
### Possible Standards Aligned Resources

#### A. References from State-Adopted Textbooks

**Glencoe**
- (1e) p. 94
- (2e) pp. 54, 60

**Holt**
- (1e) pp. 152-157, 158-159 lab

#### B. Sample Activities Aligned to the Standards

**Glencoe Activities**
- (1e) Cell Division, p. 93

**Holt Activities**
- (1e) Lab Phases of Mitosis, p. 158
- (1e) Drawing Conclusions from Data, p. 160
- (1e) Activity Making Exact Models, p. 152
- (1e, 7d) Flip Book, p. 155
- (1e, 2e, 7d) Phases of Mitosis, p. 158
- (7c) Drawing Conclusions from Data, p. 160

**Web Activities**
- http://www.cellsalive.com/mitosis.htm_Animated cell mitosis video.wnbc.com/player/?id=63037
- (2e) http://learn.genetics.utah.edu/units/basics/builddna/
- (2e) http://biology.about.com
- (2e) various DNA models
- http://www.pbs.org/wgbh/aso/tryit/dna/\# requires shockwave which is free

**Microscope Activities**
- (1e) Prepared Slides of Onion Root tips showing the stages of Mitosis
Grade 7 Instructional Component 1 Content Standard Group 5

<table>
<thead>
<tr>
<th>Standards for Component 1 Standard Group 5:</th>
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<tbody>
<tr>
<td>5d. Students know how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.</td>
</tr>
<tr>
<td>5e. Students know the function of the umbilicus and placenta during pregnancy.</td>
</tr>
<tr>
<td>2b. Students know sexual reproduction produces offspring that inherit half their genes from each parent.</td>
</tr>
</tbody>
</table>

**Key Concept for Component 1 Standard Group 5:** Sexual Reproduction in humans requires the combination of an egg and a sperm.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>5d, 5e, 2b OBTAIN PARENT PERMISSION • Students diagram the male and female human reproductive organs. (5d) • Students describe the sequence of events that may lead to fertilization. (5d) • Students explain how the umbilicus and placenta support the fetus during gestation. (5e) • Students describe the transmission of</td>
<td>Sample Performance Task Students will create an infomercial or billboard on how selected activities and behaviors impact a developing fetus. Projects should include objective as well as subjective arguments with supporting details from research. Projects should include pictures and diagrams. (5e, I&amp;E 7b, 7d, 7e)</td>
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<td></td>
<td>Sample Scoring Criteria for Performance Task A proficient project will include at least three cited pieces of evidence to support the students position.</td>
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<td>Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task • diagram and study the uterus of a pregnant woman • diagram the flow of materials across the placenta and identify the structures involved in the process • discuss how a fetus gets nutrients and eliminates (gets rid of ) wastes • research and review articles on “drug-babies”</td>
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<td></td>
<td>Possible Standards Aligned Resources A. References from State-Adopted Textbooks Glencoe (5d) pp. 504-509, 512-513, 510-511, (5e) pp. 515-516, ( 517 definitions, 518-523 tell of substances that pass through the placenta and</td>
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7-17
materials across the placenta. (5e)

umbilicus)
(2b) pp. 126-133 ( pp. 172, 175, 178, 179 Mendel’s pea plants, just review pp. 182-184 Punnett squares/p. 187 mitochondrial DNA(framework)/ p. 501 launch lab)

Holt
(2b) pp. 188-193, 194-195 lab, 555-559
(5d) pp. 556-559, 562
(5e) pp. 563-564, Quick labs 568-569

B. Sample Activities Aligned to the Standards
Glencoe Activities
(2b) Launch Lab, p. 501

Holt Activities
(2b) Explore Activity, p. 555
(2b) Quick Lab Modeling Inheritance, p. 559
(2b) Meiosis in Action, p. 190
(2b) Meiosis Skit, p. 191

Web Activities
http://www.cellsalive.com/meiosis.htm

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**Grade 7 Instructional Component 1 Content Standard Group 6**

**Standards for Component 1 Standard Group 6:**
2a. Students know the differences between the life cycles and reproduction methods of sexual and asexual organisms.
5f. Students know the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.
2b. Students know sexual reproduction produces offspring that inherit half their genes from each parent.

**Key Concept for Component 1 Standard Group 6:** There are two types of reproduction in multicellular organisms.
<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 2a, 5f, 2b             | • Students summarize the sequence of events in the life cycles of organisms that reproduce sexually and asexually. (2a)  
• Students compare sexual reproduction and asexual reproduction. (2a)  
• Students describe the sequence of events that may lead to fertilization. (5f)  
• Students illustrate the reproductive process of flowering plants. (5f)  
• Students discuss how the diploid number of chromosomes is maintained in humans. (2b) | Sample Performance Task  
Student will use a graphic organizer (Venn Diagram) to compare sexual to asexual reproduction in organisms. Include at least three items in each area of the diagram. The outer areas should be sexual and asexual reproduction, with the center shared area showing the shared characteristics (2a, 5f; I&E: 7d)  

Sample Scoring Criteria for Performance Task  
A proficient response will include the following: Venn Diagram with at least three items/characteristics of organisms that reproduce sexually and asexually; for example, in the outer area for sexual reproduction, separate male and female reproductive organs, meiosis, fertilization; for the outer area for asexual reproduction, simple mitosis, budding, spore production; for the shared area, offspring, transmission of traits, and continuation of gene pool. Students should also address the genetic outcome of asexual and sexual reproduction.  

Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task  
• utilize multimedia to study life cycles of organisms that reproduce sexually and asexually  
• review fertilization in various organisms  
• outline the characteristics of organisms that reproduce sexually  
• outline the characteristics of organisms that reproduce asexually  
• use semantic analysis (comparison chart using plusses and minuses) for the comparison of the characteristics of organisms that reproduce sexually and asexually  

Possible Standards Aligned Resources  
A. References from State-Adopted Textbooks  
Glencoe  
(2a) pp. 88-95, 126-132  
(5f) pp. 144-145, 136-139,  
(2b) p. 129  
Holt  
(2a) p. 54, 62- 63,152, 366, 372, 400-404, 427, 557
### B. Sample Activities Aligned to the Standards

#### Glencoe Activities
- (2a) Demonstration Stages of Life, p. 89

#### Holt Activities
- (2a) Comparing Methods of Reproduction, p. 62
- (5f) Build a Flower, pp. 382-383
- (5f) Dissecting, p. 369
- (2a) Plant Cuttings, p. 402
- (2b) Meiosis Skit, p. 191

#### LAUSD/S.C.A.L.E. Immersion Unit
- (2a, 5f, 2b, 7a-e) Fast plants

#### LAUSD Anchor Activities
- (2b, 2c, 2e) DNA Karotyping

#### Web Activities
- [http://www.zephyrus.co.uk/flowerrepro.html](http://www.zephyrus.co.uk/flowerrepro.html)
- [http://www.emc.maricopa.edu/faculty/afarabee/biobk/BioBookflowers.html](http://www.emc.maricopa.edu/faculty/afarabee/biobk/BioBookflowers.html)

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**Grade 7 Instructional Component 1 Content Standard Group 7**

**Standards for Component 1 Standard Group 7:**

2c. Students know an inherited trait can be determined by one or more genes.

2d. Students know plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.

**Key Concept for Component 1 Standard Group 7:** Inherited traits are determined by genes.
### Content Standard Group

<table>
<thead>
<tr>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
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</thead>
</table>
| 2c, 2d             | **Sample Performance Task**  
Given a pre-made Punnet square Bb x Bb, students will create a display of at least two drawings of characteristics that illustrate the relationship between genotype and phenotype. An explanation of dominant and recessive alleles with their expression using proper academic language should be included. (2c, 2d, I&E: 7b, 7d,) |

| **Sample Scoring Criteria for Performance Task** |
| The display should include the following: a brief explanation of the relationship between phenotype and genotype; a clear description of dominant and recessive alleles; a minimum of two illustrations showing characteristics of dominant and recessive gene alleles. |

| **Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task** |
| - review how to create posters and charts and how to organize information for visual impact/effectiveness (poster, chart)  
- discuss and identify certain traits of several organisms and include the terms dominant and recessive alleles/trait in your discussion  
- research and discuss examples of organisms exhibiting multiple gene inheritance  
- create a fictitious living organism with specific dominant and recessive traits and then use a Punnet square to indicate a possible cross |

| **Possible Standards Aligned Resources** |
| A. References from State-Adopted Textbooks  
Glencoe  
(2c) pp. 175,177  
(2d) pp. 184-187 |
<table>
<thead>
<tr>
<th></th>
<th><strong>Holt</strong></th>
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<tr>
<td>(2c)</td>
<td>pp. 177-178, 180-186, 192, 310, 312</td>
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<tr>
<td>(2d)</td>
<td>pp. 174-186, 194-195 lab</td>
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</tbody>
</table>

**B. Sample Activities Aligned to the Standards**

**Glencoe Activities**
(2d) Punnett Squares, p. 183

**Holt Activities**
(2d) Quick lab Flower Cross, p. 177
(2d) Exploring Probability, p. 182
(2d, 7d) Quick Lab Punnet Square, p. 181
(2d, 7c) Quick Lab Exploring Probability, p. 182
(2b, 2d, 7c, 7d) Modeling Space Bug Genetics, pp. 194-195

**LAUSD/S.C.A.L.E. Immersion Unit**
(2d, 2c, 7a-e) Fast plants

**LAUSD Anchor Activities**
(2d, 2c) DNA Karotyping
LAUSD - Middle School Instructional Guide  
Seventh Grade Science  

Standards for Instructional Component 2

**Standard Set 3: Evolution** - Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:
3a. Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.
3b. Students know the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.
3c. Students know how independent lines of evidence from geology, fossils, and comparative anatomy provide the basis for the theory of evolution.
3d. Students know how to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and how to expand the diagram to include fossil organisms.
3e. Students know that extinction of a species occurs when the environment changes and that the adaptive characteristics of a species are insufficient for its survival.

**Standard Set 4: Earth and Life History** - Evidence from rocks allows us to understand the evolution of life. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:
4a. Students know Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.
4b. Students know the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.
4c. Students know that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom.
4d. Students know that evidence from geologic layers and radioactive dating indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.
4e. Students know fossils provide evidence of how life and environmental conditions have changed.
4f. Students know how movements of Earth’s continental and oceanic plates through time, with associated changes in climate and geographic connections, have affected the past and present distribution of organisms.
4g. Students know how to explain significant developments and extinctions of plant and animal life on the geologic time scale.
Standard Set 5: Structure and Function in Living Systems - The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. Physical principles underlie biological structures and functions. As a basis for understanding this concept:
5a. Students know plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
5b. Students know organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.
5c. Students know how bones and muscles work together to provide a structural framework for movement.
5g. Students know how to relate the structures of the eye and ear to their functions.

Standard Set 6: Physical Principles in Living Systems - Physical principles underlie biological structures and functions. As a basis for understanding this concept:
6b. Students know that for an object to be seen, light emitted by or scattered from it must be detected by the eye.
6e. Students know that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.
6h. Students know 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).
6i. Students know how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.
6j. Students know that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.

Standard Set 7: 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:
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.
7b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
7c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
7d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g. motion of Earth’s plates and cell structure).
7e. Communicate the steps and results from an investigation in written reports and oral presentations.
# Grade 7 Instructional Component 2 Content Standard Group 1

**Standards for Component 2 Standard Group 1:**

5a. Students know plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.

5b. Students know organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.

**Key Concept for Component 2 Standard Group 1:** Living things have levels of organization that are specific, yet all levels work together in that living thing.

<table>
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<tr>
<th>Content Standard Group</th>
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</table>
| 5a, 5b                 | • Students compare the levels of organizational structure and function in plants and animals. (5a) • Students explain how organs, tissues, and cells work together to keep an organism alive. (5b) • Given a system and failure of an organ or part in that system, predict the effect. (5b) | **Sample Performance Task**  
Student uses a graphic organizer to chart five levels of organization in both plant structure and human body and rank them in order of complexity starting from the cell and moving to the more complex. Student should explain with details the relationship among the organizational levels in the graph. Include illustrations of each level of organization. (5a, 5b, I&E: 7d, 7e)  
**Sample Scoring Criteria for Performance Task**  
A proficient response should include a completed graphic organizer showing the following: at least five levels of organization in plants and animals ranked from simplest to the most complex, a detailed and complete explanation of the relationship including diagrams of the organizational levels. (5a, 5b)  
**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
- use multimedia resources to review the organization levels in both plants and animals  
- describe basic types and functions of tissues in both plants and animals  
- outline examples of relationships that exist among the different levels of organization |
### Possible Standards Aligned Resources

**A. References from State-Adopted Textbooks**

- **Glencoe**
  - (5a) pp. 100-106, 364-365
  - (5a, 5b, 7d) pp. 108-109 lab, 414-415
  - (5b) pp. 106, 400-402, 410

- **Holt**
  - (5b) pp. 445-447, 468-471

**B. Sample Activities Aligned to the Standards**

- **Glencoe Activities**
  - (5a) National Geographic –Differentiated Human Cells, p. 101
  - (5a) Mini Lab-What's in a Tissue, p. 103
  - (5b) Concepts in Motion interactive table, p.105
  - (5a, 5b) Lab-Design an Organ, pp. 108-109
  - (5b) Data Lab, p. 404

- **Holt Activities**
  - (5a) Math Practice-A Pet Protist, p. 131

- **LAUSD Anchor Activities**
  - (5a, 5b) Owl Pellets

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**Grade 7 Instructional Component 2 Content Standard Group 2**

**Standards for Component 2 Standard Group 2:**

- 5g. Students know how to relate the structures of the eye and ear to their functions.
- 6e. Students know that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.
- 6b. Students know that for an object to be seen, light emitted by or scattered from it must be detected by the eye.

**Key Concept for Component 2 Standard Group 2** The eye and the ear have specific structures which function in specific ways so sight and hearing are possible.
<table>
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<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
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</table>
| 5g, 6e, 6b             | • Students identify the structures/functions of the ear and eye and explain how the parts work together. (5g)  
• Students recall that the retinal cells react differently to different wavelengths.  
• Students discuss that white light is a mixture of different wavelengths. (6e)  
• Students compare and contrast the difference between light and pigment. (6e)  
• Students diagram the pathway of light for objects to be seen. (6b) | **Sample Performance Task**  
Student diagrams the path of light rays as they move through the nearsighted eye, identifying each part of the eye and explaining what happens to the light rays. Student repeats the same procedure for the farsighted eye. (5g, I&E: 7d, 7c)  
Student diagrams the path of a sound wave as it passes from the external to the middle and inner ear identifying each part of the ear and explaining what happens to the sound wave as it reaches the eardrum. (5g, I&G: 7g, 7e)  
**Sample Scoring Criteria for Performance Task**  
A proficient response should include the following: the major anatomical parts of both the eye and the ear including the lens, retina (with its cones and rods), iris, pupil, the outer ear, the middle ear and its corresponding parts (eardrum or tympanic membrane, malleus, incus, stapes,) and the inner ear should be labeled. The eye diagram should correctly show the different focal points for the farsighted and nearsighted eye. The ear diagram should correctly show the path of the sound waves and have the correct description of what the major parts of the ear do.  
**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
- review the following topics: vibrations, sound waves, concave and convex lenses, nearsightedness and farsightedness  
- Look up information to answer the following questions for a teacher-led class discussion: How do you see? How does light travel? How does light enter the eye? How is light focused? How do the major parts of the eye and ear function?  
**Possible Standards Aligned Resources**  
A. References from State-Adopted Textbooks  
Glencoe  
(5g) pp. 450-456, 474-476, 482, 486-488 labs 458-459, 469, 477, 489, 490-491  
(6b) pp. 450-456, 431, 441, 445-446  
(6e) pp. 439, lab 425, 454 |
### Sample Activities Aligned to the Standards

#### Glencoe Activities
- (5g) Concepts in Motion interactive table- ca.7.mssscience.com, p. 453
- (5g) Lab- Can a Cow Teach You about Your Eyes?, pp. 458-459
- (5g) Mini Lab-How does an Ear Hear?, p. 489

#### Holt Activities
- (5g) Dissecting a Cow’s eye, p. 542
- (5g) Quick Lab-What Does the Ear Drum Do?, p. 539

#### LAUSD Anchor Activities
- (5g) Paper eye model

### Grade 7 Instructional Component 2 Content Standard Group 3

#### Standards for Component 2 Standard Group 3
6h. Students know 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).
5c. Students know how bones and muscles work together to provide a structural framework for movement.
6i. Students know how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.

**Key Concept for Component 2 Standard Group 3:** Muscles, bones, and joints work in specific ways so movement is possible.

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<th>Content Standard Group</th>
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</table>
| 6h, 5c, 6i             | • Students compare joints in the body with | **Sample Performance Task**
|                        |       | Student will choose one body joint (wrist, shoulder, and thigh) to illustrate, annotate, and explain in detail. |
structures used in machines and simple devices. (6h)

- Students analyze the interactions between bones, muscles and joints to allow for movement in a particular joint. (5c)

- Students demonstrate and exemplify how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system. (6i)

The diagram or model should include all the bones and muscles involved in the movement of this joint, name of the joint, and identification as of the type of joint (hinge, ball-and-socket, sliding). The student will also identify an example of an everyday device with movement similar to that of the chosen body joint. The student will diagram the device, label its parts, and describe how its movement is similar to that of the chosen body joint. (6h, 5c, I&E: 7b, 7d, 7e)

Sample Scoring Criteria for Performance Task
The diagram or model should include the following: an annotated drawing of a specific body joint with a detailed explanation of the type of body joint and the bones and muscles used to move the joint; a detailed and labeled drawing of a device exhibiting movement similar to that of the chosen body joint; a description of the comparison between both joints.

Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task
- In-class discussion of the following topics: What is a joint? What is an immovable joint? A movable joint? Range of Motion?
- Brainstorm and then research (using the web) the types of body joints and devices with similar joints.

Possible Standards Aligned Resources
A. References from State-Adopted Textbooks
Glencoe
(5c) pp. 362-363, 357, 377, 360-367
(6h) pp. 363-367, 369, 377-379, lab 378-379
(6i) pp. 368-375, 377, lab 378-379, 376

Holt
(5c) pp. 428, 445, 472-477, 450 Quick Labs 465
(6h) pp. 465 lab, 474-475
(6i) pp. 478-479, 482-483 lab

B. Sample Activities Aligned to the Standards
Glencoe Activities
(6h) Concepts in Motion–Joints, p. 363
(6i) Concepts in Motion–Levers, p. 371
<table>
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<th>Content Standard Group</th>
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<th>Instructional Resources</th>
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| 6j                      | • Students illustrate, and explain how contractions of the heart generate blood pressure. (6j) • Students describe how a heart valve works and provide a correlation or example | **Sample Performance Task**  Students will illustrate and describe the functions of two types of values in the body. Include a brief description of the type and function of each valve. (6j, I&E: 7b, 7d)  

**Sample Scoring Criteria for Performance Task**  A proficient response will include an accurately labeled illustration and written descriptions of the functions in proper academic language  

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
• Review the route that blood follows through the circulatory system.  
• Using models or science textbooks investigate how heart valves work and briefly describe their function. |
of a valve. (6j) operation.
• Use library resources to research the function of different types of valves.

Possible Standards Aligned Resources
A. References from State-Adopted Textbooks
Glencoe
(6j) pp. 407-409, lab 412, 414-415

Holt
(6j) pp. 495 lab, 496-498, 500-507

B. Sample Activities Aligned to the Standards
Glencoe Activities
(6j) Virtual Lab-Hypertension, p. 407
(6j) Concepts in Motion-Blood Flow, p. 409
(6j) Lab-What Happens When the Cardiopulmonary System Breaks Down?, pp. 414-415
(6j) Real World Science, pp. 416-417

Holt Activities
(6j) Modeling a Valve, p. 495
(6j) Quick Lab-Vessel Blockage, p. 500
(6j) Modeling Blood Pressure, p. 504

Web Activities
(6j) www.digitalfrog.com

Grade 7 Instructional Component 2 Content Standard Group 5

Standards for Component 1 Standard Group 5:
3a. Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.
3e. Students know that extinction of a species occurs when the environment changes and that the adaptive characteristics of a species are insufficient for its survival
3b. Students know the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.
4f. Students know how movements of Earth’s continental and oceanic plates through time, with associated changes in climate and geographic
connections, have affected the past and present distribution of organisms.  

**Key Concept for Component 1 Standard Group 5:** Diversity, evolution and extinction are caused by genetic variation, environmental and geographic factors.

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<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
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</table>
| 3a, 3e, 3b, 4f         | • Students examine the role that genetic variation and environmental factors play in the process of evolution. (3a)  
  • Students determine the role of these factors in the diversity of organism. (3e)  
  • Students given an environmental change, relate an animal’s characteristics to its survival. (3e)  
  • Students summarize, outline or diagram the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution. (3b) | **Sample Performance Task**  
Student will design an organism that will survive a teacher defined environment. The student will also describe the two characteristics and tell how these characteristics relate to their organisms survival in a teacher-defined environment. (3a, 3e, I&E: 7d.)  

**Sample Scoring Criteria for Performance Task**  
The organism should include at least two genetic variations for each of the two different characteristics, explain how the characteristics affect survival in the teacher-defined environment.  

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
• The following topics should be discussed: animal adaptation to their physical environment, weather, food chains  
• Review the events that could possibly lead to extinction of a species (habitat loss, increased competition for resources, newly introduced predators).  
• Discuss Natural Selection  

**Possible Standards Aligned Resources**  
A. References from State-Adopted Textbooks  

*Glencoe*  
(3a) pp. 215, 220,258  
(3b) pp. 210 –217  
(3e) pp. 224, 226-227  
(4f) pp. 257-259  
(7d) p. 214 lab
• Students identify and explain factors that contribute to the distribution of animals. (4f)

| Holt | (3a) pp. 296-327 318-319 Inquiry Lab 312-317 |
|      | (3b) pp. 306 - 311 Quick Labs, 306-311 |
|      | (3e) pp. 313-317 |
|      | (4f) pp. 275 Quick Labs, 270-283 |
|      | (7d) p. 214 lab |

B. Sample Activities Aligned to the Standards

Glencoe Activities
(3b) Virtual Lab-Natural Selection, p. 212
(3a) National Geographic-Natural Selection, p. 213
(3a, 3b, 7c) Mini Lab–Bird Beaks, p. 214
(3e) Concepts in Motion-Extinction, p. 226
(4f) National Geographic-Geographic Isolation, p. 258

Holt Activities
(3b) Growth vs. Food supply, p. 309
(3a, 3e) Bird Beak adaptations. p. 313
(3a, 7c, 7e) Surviving Climate Change, pp. 318-319
(3a) Explore Activity-Modeling Successful Traits, p. 297
(3b) Quick Lab-Population Growth vs. Food Supply, p. 309
(3a, 7c, 7e) Inquiry Lab-Survival of the Chocolates, p. 319

Grade 7 Instructional Component 2 Content Standard Group 6

Standards for Component 2 Standard Group 6:
4e. Students know fossils provide evidence of how life and environmental conditions have changed.
4g. Students know how to explain significant developments and extinctions of plant and animal life on the geologic time scale.
4b. Students know the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.

Key Concept for Component 2 Standard Group 6: Fossils are a significant factor in determining the geological time scale and can also indicate how life and environmental conditions have changed over time.
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<tr>
<th>Content Standard Group</th>
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</table>
| 4e, 4g, 4b            | • Students justify that fossils evidence indicates how life and environmental conditions have changed over time. (4e) • Students propose a reason for mass extinction and justify your reasoning. (4g) • Students describe the effect of catastrophic events that have disrupted life on Earth. (4b) | **Sample Performance Task**  
Student will create a travel brochure of at least four panels to promote and advertise a period within a given Geological Era. Brochure should include a title page, examples of fossils, environmental conditions, at least two plants and two animals from that Era, examples of possible extinctions at the end of the Era with justified reasoning based on fossil records, environmental condition changes, or possible catastrophic events. (4e, 4g, 4b, I&E 7d, 7b)  
**Sample Scoring Criteria for Performance Task**  
A proficient response will include the following: a brochure of at least four panels (one of the panels is the title page) with fossil samples, at least two animals and plants from that era, information on possible extinctions and their possible cause(s), a description of environmental conditions and changes, and any catastrophic events that occurred.  
**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
• Look up brochure samples and styles on the web  
• Research fossil evidence and environmental conditions of the various Eras  
• Discuss living organisms that inhabited the Earth during the various eras  
• Review major catastrophic events  
**Possible Standards Aligned Resources**  
A. References from State-Adopted Textbooks  
Glencoe  
(4e) pp. 247-248, 316-317, 325-339, lab 249  
(4b) pp. 325-339, 316-323,  
(4g) pp. 316-323, 325-339  
Holt  
(4b) pp. 236 Explore Activity, Quick Lab 233  
(4e) pp. 236, 267, 275 Quick Lab 237, 264-269,272-275, 277-282, Lab 284-285  
(4g) pp. 276-283 |
**B. Sample Activities Aligned to the Standards**

**Glencoe Activities**
- (4c, 7d) Virtual Lab-Fossil age, p. 247
- (4g, 7c) Launch Lab and Foldable, p.313
- (4g, 7c) Graphic Organizers, pp. 314-315
- (4g) Concepts in Motion-Geologic Times Scale, p. 317
- (4e, 7d) Mini Lab-Fossils, p. 327
- (4g) National Geographic-Marine Reptiles Adaptations, p. 335
- (4e, 7c) Mini Lab-Fossil Evidence, p. 340

**Holt Activities**
- (4b) Explore Activity-Quick Lab p. 236
- (4e) Skills Practice Lab, pp. 284-285

**LAUSD Anchor Activities**
- (4e) Prehistoric Remains

**Web Activities**
- [www.ucmpberkeley.edu](http://www.ucmpberkeley.edu) Explorations through Time

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**Grade 7 Instructional Component 2 Content Standard Group 7**

**Standards for Component 2 Standard Group 7:**

4c. Students know that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom.
4a. Students know Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.
4d. Students know that evidence from geologic layers and radioactive dating indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.
3c. Students know how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.
3d. Students know how to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and
how to expand the diagram to include fossil organisms.

**Key Concept for Component 2 Standard Group 7:** The major factors that are used to determine Earth's history are radioactive dating, geological layers, and fossils.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 4c, 4a, 4d, 3c, 3d     | • Students determine the relative age of fossils based on their position or location in the rock strata. (4c)  
• Students predict the long-term geologic effect of a particular geologic process. (4a)  
• Students know the age of the Earth and life has existed for more than 3 billion years and be able to justify or explain with evidence from geologic layers and radioactive dating. (4d)  
• Students distinguish between relative and absolute dating. (4d) | Sample Performance Task  
Students will write a summary on how a geologist find the relative age of a rock, and outline the differences between relative and absolute dating. This summary could be modeled after a scientific abstract. (4c, 4d, I&E: 7e)  
Sample Scoring Criteria for Performance Task  
The summary should include a detailed explanation of how rocks are dated. An explanation comparing relative and absolute dating should also be included in the summary. The summary should be written in 75 words or less.  
Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task  
• Introduce students to the concepts of relative time, absolute time, radioactivity and rates of radioactive decay.  
• Explain that relative age is a concept often used in the study of rocks.  
• Research for the type of information required to write scientific abstracts and review some examples with students.  
Possible Standards Aligned Resources  
A. References from State-Adopted Textbooks  
*Glencoe*  
(3c) pp. 244-245, 249-254, 256  
(3d) pp. 264-267  
(4a) pp. 284-285,  
(4c) pp. 246-249, 286 – 291  
(4d) pp. 293-299  
(7d) pp. 264 lab, 267 lab |
| Students evaluate how genetic variation, the fossil record, and geologic events account for the evolution or extinction of organisms. (3c) | Holt  
(3c) pp. 239-241, 246-249, 263-269, 299-305  
(3d) pp. 301, 336  
(4a) pp. 234-237, 270-275  
(4c) pp. 243-244  
(4d) pp. 246-251, 243-244, 246-251, 276-282 |
|---|---|
| Students construct a simple fossil branching diagram based on shared characteristics. (3d) | B. Sample Activities Aligned to the Standards  
**Glencoe Activities**  
(3c, 7d) Mini Lab-How Fossils Form, p. 249  
(3a) Data Lab-Evolution, p. 255  
(3b, 7d) Mini Lab-Dichotomous Key, p. 264  
**Holt Activities**  
(4c) Solve A Rock-Layer Puzzle, p. 244  
(4d) Radioactive Decay, p. 248  
(4d, 4g) Timeline of Earth’s History, p. 278  
(4e, 7d) Interpreting Fossil Finds, p. 284  
(3d) Fossils and Branching Diagrams, p. 342 |
| **LAUSD Anchor Activities**  
(4c) Making the Rock Cycle Childs Play |
Exploing Variation and Natural Selection with Fast Plants

7th Grade Immersion Unit

This draft document is the result of several months of writing and discussion as part of the SCALE Math and Science Partnership. It is a living document open to change based on feedback from pilot testing and input. It is intended to be circulated for consultation to the SCALE community and other interested parties. A final version will be made available near the end of the SCALE project in 2007. To check on the latest version or to offer comments/suggestions regarding the content of this document, please contact your Local District Science Personnel or MST Center Science Personnel.
Exploring Variation and Natural Selection with Fast Plants

Please note the following is an overview of a 7th grade Variation and Natural Selection Immersion Unit (extended investigation in science). This unit was developed in partnership with the Los Angeles Unified School District and is being tested and revised by teachers, scientists, and curriculum developers associated with the NSF-funded Math/Science Partnership, System-wide Change for All Learners and Educators (SCALE) and the DOE-funded Quality Educator Development (QED) project at the California State University – Dominguez Hills.

The preparation of this report was supported by a grant from the National Science Foundation to the University of Wisconsin–Madison (EHR 0227016). At UW–Madison, the SCALE project is housed at the Wisconsin Center for Education Research. The other partners are the University of Pittsburgh, where the SCALE project is housed within the Learning Research and Development Center’s Institute for Learning; California State University at Dominguez Hills and Northridge; Los Angeles Unified School District; Denver Public School District; Providence Public School District; and Madison Metropolitan School District. Any opinions, findings, or conclusions are those of the author and do not necessarily reflect the view of the supporting agency.
Unit Overview

This Immersion Unit engages students in an inquiry and its supporting activities to develop an understanding of variation and natural selection. This unit is designed to build on student’s prior knowledge of how environmental conditions affect the growth and development of an individual organism to an understanding of how environmental conditions and genetics influence the amount of variation within a population of organisms.

Students investigate:

• how variation within a population is influenced by environmental factors
• how environmental factors influence reproductive success in a population

Both inherited and environmental factors influence variation among individuals in a population. Every living organism, at any moment in its life, is what it is because its genes have guided its development through all the environmental conditions under which it has grown, developed, and reproduced. In addition, the reproductive success of individuals within each population influences the variation observed between that population’s generations.

In this unit, students engage in an inquiry using Fast Plants, rapid-cycling Brassica rapa, accompanied by content-rich readings and a natural-selection simulation to investigate these key concepts. Because of their ease of growth and short life cycle (seed to seed in 40 days), Fast Plants are especially suited to the central inquiry in this unit. By growing plants in different situations, students investigate the effects of environmental differences on the variation among individuals in a population; this illustrates that genetic code and environmental factors combine to influence the variation among individuals in a population. Building on that understanding, students apply knowledge of artificial and natural selection, gained through readings and a simulation, to predict how future generations of Fast Plants subjected to the same environmental conditions might change over time.

Exploring Variation and Natural Selection with Fast Plants is designed to guide students to develop a foundation of knowledge about variation so that they can logically explain the results of their Fast Plant investigation. Students also use their knowledge of natural selection to predict a reasonable change in variation in future generations as a result of environmental influences.

Unit Key Concepts

The key concepts that students will study in this Immersion Unit are:

• Individual organisms with certain variations of traits are more likely than others to survive and reproduce successfully.
• When environmental conditions change it can affect the survival of both individual organisms and entire species.
• Selective breeding can result in the accumulation of small differences between parents and offspring in successive generations, eventually resulting in descendants that are very different from their ancestors.
• Variation within a population is influenced by both inherited and environmental factors.
California Grade 7 Science Standards:

Genetics (Life Science Strand)
2. A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept:
   2b. *Students know* sexual reproduction produces offspring that inherit half their genes from each parent.

Evolution (Life Science Strand)
3. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:
   3a. *Students know* both genetic variation and environmental factors are causes of evolution and diversity of organisms.
   3b. *Students know* the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.
   3e. *Students know* that extinction of a species occurs when the environment changes and that the adaptive characteristics of a species are insufficient for its survival.

Structure and Function of Living Systems (Physical Science Strand)
5. The Anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. As a basis for understanding this concept:
   5f. *Students know* that the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.

Investigation and Experimentation Strand
7. Scientific progress is made by asking meaningful questions and conducting careful investigations. As for 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:
   7a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tasks, collect data, and display data.
   7b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
   7c. Communicate the logical connections among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from scientific evidence.
## Implementation Timeline

<table>
<thead>
<tr>
<th>Step</th>
<th>Lesson</th>
<th>Key Concepts</th>
<th>Time, minutes</th>
</tr>
</thead>
</table>
| Step 1 | Step 1 Lesson 1 Can They Grow?              | • Both genetic variation and environmental factors influence growth and development.  
• Scientific progress is made by asking meaningful questions and conducting careful investigations.                                              | 55 minutes    |
|        |                                             | Additionally, 2-20 minute observation sessions at 7 and 10 days after planting.                                                                                                                               |               |
| Step 2 | Step 2 Lesson 1 Recognizing Variation       | • Variation can be observed among individuals.  
• Variation can be observed between populations.  
• When scientists who are studying the same phenomenon start with different information, they often make different observations and ask different questions. | 90 minutes    |
| Step 3 | Step 3 Lesson 1 Describing Plants           | • Individuals can be described by their characteristics, or traits.  
• Populations can be described by numerical data describing the traits that exist in the population.                                                                                           | 35 minutes    |
| Step 4 | Step 4 Lesson 1 Heritable Traits            | • Only inherited traits can be passed from one generation to the next.  
• Variation is genetically determined difference in the characteristics of members of the same species.  
• Scientific progress is made by asking meaningful questions and conducting careful investigations.                                                                 | 50 minutes    |
|        |                                             | 24-26 days until evidence from offspring is collected                                                                                               |               |
| Step 5 | Step 5 Lesson 1 Investigation Design        | • Environmental factors influence plant survival and reproductive success.  
• The influence of environmental factors on reproductive success (measured by seed production) can be investigated through a controlled experiment.  
• Scientific experimental design includes planning for careful observation and data collection.                                                                 | 50 minutes    |
| Step 6 | Step 6 Lesson 1 Mechanism for Change        | • Selection is a process that determines which individuals in a population will contribute their genetic heritage to the next generation.  
• Artificial selection is human-guided selection.  
• Natural selection is selection in which some members of a species have greater reproductive success because they possess genetically determined characteristics that confer an advantage in a particular environment. | 45 minutes if reading is assigned as homework  
90 minutes if reading is done in class |
<table>
<thead>
<tr>
<th>Step</th>
<th>Lesson</th>
<th>Key Concepts</th>
<th>Time, minutes</th>
</tr>
</thead>
</table>
| Step 7  | Step 7 Lesson 1 Selection Simulation        | • Individual organisms with certain traits are more likely than others to survive and have offspring.  
• Changes in environmental conditions can affect the survival of individual organisms and entire species.                                             | 45 minutes                                         |
|         |                                             | Step 7 Lesson 2 Variation Analysis                                                                                     | 45 minutes                                         |
|         |                                             | • Genetic variation provides a population with the potential to reproduce under changing environmental conditions.  
• Changes in environmental conditions can affect the survival of individual organisms and entire species.  
• Without variation in a population, changes in environmental conditions can lead to extinction.   |                                                   |
| Step 8  | Step 8 Lesson 1 Investigation: Flowers and Seeds | • The flowering plant life cycle includes pollination, which leads to seed production.  
• Experimental data and observations need to be systematically collected and carefully organized so that they can provide evidence to support claims that can answer the question being investigated. | 60 minutes more time required if students need a review of sexual reproduction in flowering plants |
| Step 9  | Step 9 Lesson 1 Heritable Traits: Results and Explanations | • Acquired traits like the leafless condition acquired by the plant in Step 3, are not inherited.  
• Explanations that answer scientific questions are built by logical reasoning that links evidence-based claims. | 100 minutes                                        |
| Step 10 | Step 10 Lesson 1 Investigation Explanation   | • Experimental evidence and credible scientific information can be used to support claims that can be logically linked to form scientific explanations.  
• When fact and opinion are intermingled in a claim or an explanation does not follow logically from the given evidence, the explanation and/or conclusion is not considered scientific. | 45 minutes if written explanations assigned as homework  
90 minutes if explanations are written in class |
Getting Started with Fast Plants

Wisconsin Fast Plants (Rapid-cycling *Brassica rapa*) are a result of 30 years of plant breeding at the University of Wisconsin—Madison. Selected to grow, develop, and reproduce quickly for research, these plants have unique properties that make them ideally suited to short semesters, small spaces, and youthful impatience:

- Rapid growth (40 days seed planting to seed harvest)
- Petite size (15 cm tall and able to grow in 2 cm² of soil)
- Wide variety of easily recognizable genetic traits

Fast Plants need only water, 24-hour fluorescent lighting, and fertilizer. Today these easy to care for plants are used at all grade levels in classrooms worldwide. For additional information visit the Wisconsin Fast Plants Program website at www.fastplants.org.
8th Grade:
Focus on Physical Science

Legend

Student Achievement

Assessment

Instructional Matrix

Instruction

9-1
IX. Introduction to the 8th Grade Science Section

**District Course Name:** Science 8 AB

**Thumbnail Description:** Annual Course—Grade, No Prerequisite

**Course Code Number and Abbreviation:**
- 36-01-05 Science 8A (41-36-11 Sci 8A (Students with disabilities served in SDC))
- 36-01-06 Science 8B (41-36-12 Sci 8B (Students with disabilities served in SDC))

**Brief Course Description:**
The major purpose of this course is to provide all students with science concepts and ideas that build upon the students’ K–7 experience. Emphasis should be placed on Investigation and Experimentation and the Science Standards. This course is planned to help students gain the knowledge and skills necessary for leading a successful and productive life in a technological society and to give them the foundation for future science studies that will enable them to become scientifically literate citizens. The middle school teacher uses a balanced (inquiry/text) approach and establishes connections between the various disciplines of Earth/Space Science, Physical Science, and Life Science with an emphasis on Physical Science in this introductory secondary science course. Inter-connections with other curricular areas are also made.

**Content of this Section:**
- 8th Grade Periodic Assessments Organizer - A place for you to write down the 5 day window for your assessment.
- Science Instructional Guide Graphic Organizer Overview for 6th Grade - Provides the user with the Content Standards for the 3 Periodic Diagnostic Assessments.
- Legend Key for Matrix Chart - Provides a key that explains the Matrix Chart
- LAUSD - 8th Grade Science Matrix Chart - Contains the Content Standards, the standards grouped in Content Standard Groups, the Standards Analyzed, and Instructional Resources with Sample Performance Tasks, Sample Scoring Criteria, Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task, and Possible Standards Aligned Resources.

**Physics is very muddled again at the moment; it is much too hard for me anyway, and I wish I were a movie comedian or something like that and had never heard anything about physics!**

8th Grade

Periodic Assessments Organizer

This page will serve as a reference for you. Please fill in your appropriate track periodic assessment dates. Also fill in the dates for 4 days of reflection, intervention, and enrichment following the first two periodic assessments.

<table>
<thead>
<tr>
<th>Grade 8 Periodic Assessment</th>
<th>Periodic Assessment I</th>
<th>4 day Reflection, Intervention, Enrichment</th>
<th>Periodic Assessment II</th>
<th>4 day Reflection, Intervention, Enrichment</th>
<th>Periodic Assessment III</th>
<th>Reflection, Intervention, Enrichment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Window Single Track</td>
<td></td>
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<tr>
<td>Assessment Window Three Tracks</td>
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<tr>
<td>Assessment Window Four Tracks</td>
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</tr>
</tbody>
</table>
Science Instructional Guide Graphic Organizer
Overview for Grade 8

I. Major District Initiatives
- Secondary Literacy Plan
- IFL Nine Principles of Learning
- Culturally Relevant Teaching Methods to Close the Achievement Gap
- Small Learning Communities
- LAUSP
- MSP-SCALE

II. State of California Document
- The California Content Standards
- Science Framework for California Public Schools
- California Standards for the Teaching Profession

III. Science Pedagogy

IV. Assessment
- Periodic Assessment
- Scoring of Periodic Assessments
- Unit Reflection and Intervention

Appendix
- District Contacts and other useful information

Instructional Component 1
- Standard Set I
  (1a, 1b, 1c, 1d, 1e, 1f),
  (2a, 2b, 2c, 2d, 2e, 2f),
  (8a, 8b, 8c, 8d),
  (9a, 9b, 9c, 9d, 9e, 9f, 9g)
- Content Standard Group
- Analyzed Standard
- Instructional Resources:
  - Sample Performance Tasks
  - Sample Scoring Criteria
  - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
  - Possible Standards Aligned Resources

Instructional Component 2
- Standard Set II
  (3a, 3b, 3c, 3d, 3e, 3f)
  (5a, 5b, 5c, 5d, 5e)
  (7a, 7b, 7c) (9a, 9b, 9c, 9d, 9e, 9f, 9g)
- Content Standard Group
- Analyzed Standard
- Instructional Resources:
  - Sample Performance Tasks
  - Sample Scoring Criteria
  - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
  - Possible Standards Aligned Resources

Instructional Component 3
- Standard Set III
  (2g), (4a, 4b, 4c, 4d, 4e),
  (6a, 6b, 6c),
  (9a, 9b, 9c, 9d, 9e, 9f, 9g)
- Content Standard Group
- Analyzed Standard
- Instructional Resources:
  - Sample Performance Tasks
  - Sample Scoring Criteria
  - Some Suggested Concepts and Skills to Support Student Success on the Sample Performance
  - Possible Standards Aligned Resources

Overarching Instructional Components
- Review and Re-teach
- Review results of Periodic Assessments
- Extended Learning Interventions
- Student/teacher reflection on student work
- End of unit assessments
- Use of data

Science Periodic Assessment 1

Science Periodic Assessment 2

Science Periodic Assessment 3

California NCLB Standards Test
NOTE: The *Instructional Guide Matrix* that follows lays out an “instructional pathway” that teachers may use as a guide for teaching the Standards Set for each Instructional Component. Explanations within each box or column of the Legend on this page describe the information that a teacher will find in the boxes and columns of the matrix that follows this Legend.

## Standards for Instructional Component

The Standard Sets lay the foundation for each Instructional Component. The standards to be learned during this Instructional Component are listed numerically and alphabetically for easy reference and do not intend to suggest any order of teaching the standards.

### Content Standard Group:

The standards within each Standard Set are organized into smaller “Standard Groups” that provide a conceptual approach for teaching the standards within each Instructional Component.

### Key Concept for the Content Standard Group: The Key Concepts signify the “big idea” represented by each Standards Group.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standards</th>
<th>Instructional Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Standards grouped here cover the Key Concept.</td>
<td>Analyzed Standards are a translation of the State's content standards (that begin with students know) Into statements of student performance that describes both the activity and the &quot;cognitive&quot; demand placed</td>
<td><strong>Sample Performance Task</strong>  &lt;br&gt;The Performance Tasks are instructional/assessment tasks aligned to one of more of the Analyzed Standards in a Standards Group. Teachers may want to adopt or adapt these Performance Tasks for use in their classroom instructional programs. Each Performance Task sets “clear expectations” for student performance, engages the students in academically rigorous learning activities, and provides opportunities for conceptual development through accountable talk if the task is done in groups.</td>
</tr>
</tbody>
</table>
on the students. The detailed description of the content standards in the *Science Framework for California Public Schools: Kindergarten Through Grade Twelve* (2003) was used extensively in the development of the analyzed standards.

<table>
<thead>
<tr>
<th>Sample Scoring Criteria for Performance Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scoring criteria those teachers might use to score the sample performance task.</td>
</tr>
</tbody>
</table>

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**

These are “scaffolding” strategies that teachers might use in designing instruction that will provide students with the skills, knowledge, and conceptual understanding to perform successfully on the task.

**Possible Standards Aligned Resources**

A. References from State-Adopted Textbooks

Textbook references from LAUSD adopted series that have been correlated with the Content Standard Group. (The standard(s) for each reference are in parenthesis before the page numbers.)

B. Sample Activities Aligned to the Standards
Standards for Instructional Component 1

**Standard Set 1: Motion** - The velocity of an object is the rate of change of its position. As a basis for understanding this concept:
1a. Students know position is defined in relation to some choice of a standard reference point and a set of reference directions.
1b. Students know that 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.
1c. Students know how to solve problems involving distance, time, and average speed.
1d. Students know the velocity of an object must be described by specifying both the direction and the speed of the object.
1e. Students know changes in velocity may be due to changes in speed, direction, or both.
1f. Students know how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction.

**Standard Set 2: Forces** - Unbalanced forces cause changes in velocity. As a basis for understanding this concept:
2a. Students know a force has both direction and magnitude.
2b. Students know when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.
2c. Students know when the forces on an object are balanced; the motion of the object does not change.
2d. Students know 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.
2e. Students know that 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).
2f. Students know the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.

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

**Standard Set 9: 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.

9a. Plan and conduct a scientific investigation to test a hypothesis.
9b. Evaluate the accuracy and reproducibility of data.
9c. Distinguish between variable and controlled parameters in a test.
9d. Recognize the slope of the linear graph as the constant in the relationship \( y = x \) and apply this principle in interpreting graphs constructed from data.
9e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
9f. 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).
9g. Distinguish between linear and nonlinear relationships on a graph of data.

Grade 8 Instructional Component 1 Content Standard Group 1

Standards for Component 1 Standard Group 1:
1a. Students know position is defined in relation to some choice of a standard reference point and a set of reference directions. (Framework pp. 125-126)

Key Concept for Component 1 Standard Group 1: The position of an object is defined in relation to a reference point and reference directions.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 1a                     | • Students identify the position of an object relevant to a reference point and a set of reference directions  
• Students differentiate the position of an object by | **Sample Performance Task**  
Student diagrams and describes the position of an object in the classroom relative to a standard reference point (identified by the teacher). Label the diagram using meters as the unit of measure. Use a plus sign (+) for right of and in front of the reference point. Use, a minus sign (-) for left of and behind the reference point. The diagram should have a labeled reference point. The student’s position must labeled with both distance measurements, and directions relative to the reference point. (e.g., -2 meters to the left and +5 meters in front of the back door) (1a)  
**Sample Scoring Criteria for Performance Task**  
Student product should have a labeled reference point. The indicated distances from the reference point to the object must be labeled with 1) distance measurements in meters and 2) direction relative to reference point. |
assigning a negative or positive sign to the displacement of the object relevant to the reference point

- Students illustrate the motion of an object in a two dimensional (x, y) coordinate system

<table>
<thead>
<tr>
<th>Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reference point (academic language, TPS)</td>
</tr>
<tr>
<td>• Distance measurement (cooperative groups)</td>
</tr>
<tr>
<td>• Practice relating plus and minus to directions (e.g., left and right) (cooperative groups)</td>
</tr>
<tr>
<td>• Diagramming reference point and distances on an x-y coordinates (graphic organizers)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Possible Standards Aligned Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. References from State-Adopted Textbooks</td>
</tr>
<tr>
<td>Glencoe</td>
</tr>
<tr>
<td>(1a) pp. 48-49, 51-52, 55, 78</td>
</tr>
<tr>
<td>Holt</td>
</tr>
<tr>
<td>(1a) pp. 336-337</td>
</tr>
<tr>
<td>B. Sample Activities Aligned to the Standards</td>
</tr>
<tr>
<td>Glencoe Activities</td>
</tr>
<tr>
<td>(1a) Mini Lab-Negative Positions, p. 49</td>
</tr>
<tr>
<td>(1a) Data Lab-How can a graph show relative position?, p. 55</td>
</tr>
<tr>
<td>Holt Activities</td>
</tr>
<tr>
<td>(1a) Quick Lab-Reference points and position, p. 337</td>
</tr>
<tr>
<td>LAUSD Force and Motion Immersion Unit</td>
</tr>
<tr>
<td>(1a) Unit 1.1 Find a seat</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Grade 8 Instructional Component 1 Content Standard Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1b. Students know that 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. (Framework pp. 126-127)</td>
</tr>
<tr>
<td>1c. Students knows how to solve problems involving distance, time, and average speed. (Framework p. 127)</td>
</tr>
</tbody>
</table>
### Key Concept for Component 1 Standard Group 2

The average speed of a moving object is defined as the total distance traveled divided by the total time.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 1b, 1c                 | • Students measure the total distance of an object’s motion relevant to a reference point as well as the time it took for the object to travel that distance (1b)  
• Students calculate the average speed of the object’s motion by using the algebraic expression: \( v = \frac{d}{t} \) (1b)  
• Students solve speed problems using the algebraic expression: \( d = rt \); given any two of these quantities (variables), students can calculate the third | Sample Performance Task  
Students conduct a Student lab using a moving object. Students collect the time and distance data at several distance intervals during the object’s motion. Students calculate speed for each interval and the average speed.  
Students graph Student lab data in a distance vs. time graph.  
Student report should include:  
• detailed procedures  
• data table,  
• calculations for speed and average speed,  
• Distance and Time graph,  
• calculation of slope,  
• analysis section relating slope to average speed  
• discussion (conclusion) - explanation of what the slope tells you about the motion of the object, (1b, 1c, 9a, 9d, 9e, 9f,)  
Sample Scoring Criteria for Performance Task  
Student product should have a  
• detailed procedures  
• data table,  
• calculations for speed and average speed,  
• distance and time graph,  
• calculation of slope,  
• analysis section relating slope to average speed,  
• discussion (conclusion) - explanation of what the slope tells you about the motion of the object.  
Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task  
• Distance measurement (cooperative group) |
| quantity (variable) using: $d=rt$, $t=d/r$, $r=d/t$ (1c) | • Measuring time with a stopwatch (cooperative group)
• Graphing in a Cartesian coordinate system (academic language) (graphic organizer)
• Calculating and interpreting the slope of a line in a graph. (TPS)
• Multiplication and division, and/or use of a calculator (cooperative group)
• Solving a three-variable mathematic expression for a given variable, given values for the other two variables. (cooperative group)
• Writing a procedure, and making a data table (cooperative group)
• How to research, organize, write, and edit a report according to the teacher’s specifications (cooperative group) |

**Possible Standards Aligned Resources**

A. References from State-Adopted Textbooks

**Glencoe**
(1b) pp. 56-58, 78

**Holt**
(1b, 1c) p. 338

B. Sample Activities Aligned to the Standards

**Glencoe Activities**
(1b) Mini Lab “Can you measure average speed?”, p. 63
(1c) (virtual lab CD) “What is the relationship between distance, average speed and time.”
(1c) Applying Math, p. 62

**Holt Activities**
(1b, 1c) Explore Activity, The Domino Derby, p. 335
(1b, 1c) Quick Lab-Changing Average Speed 11, Inquiry Challenge (Measure and calculate speed of windup toy). p. 339
(1b, 1c) Math Focus, calculating average speed, p. 338

**LAUSD Force and Motion Immersion Unit**
(1b, 1c) Lesson 1.2 Runner’s Speed

**LAUSD Anchor Activities**
### Content Standard Group 3

#### Standards for Component 1 Standard Group 3

1d. *Students know* the velocity of an object must be described by specifying both the direction and the speed of the object. (Framework pp. 127-128)

1e. *Students know* changes in velocity may be due to changes in speed, direction, or both. (Framework p. 128)

#### Key Concept for Component 1 Content Standard Group 3: Velocity describes speed and direction

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 1d, 1e                 | • Students describe the velocity of an object’s motion by specifying speed and direction (vector) (1d) • Students describe a change in velocity as a change in speed, direction or both (1e) • Students describe acceleration as the | **Sample Performance Task**  
Student walks a pre-determined, non-linear course holding a full cup of water. Spills are evidence of changes in direction or speed. Student makes a labeled diagram of his/her path in the course, identifying the location of each spill as a change of velocity because he/she was speeding up, slowing down, or changing direction. (1d, 1e)  

**Sample Scoring Criteria for Performance Task**  
Student product should indicate path taken. Student labels turns, Labels should describe velocity changes,. (Example: slowing down going into the turn, changing direction during the turn, and speeding up going out of the turn.)  

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
• Review Speed (speed=d/t) (TPS)  
• Velocity (speed and direction) (Academic language)  
• velocity changes (acceleration: speeding up, slowing down and changing direction) (Academic Language)  
• conduct activity in small groups |
rate at which [an object’s] velocity changes with time (1e) | **Possible Standards Aligned Resources**  
A. References from State-Adopted Textbooks  
  **Glencoe**  
  (1d) pp. 59, 53  
  (1e) p. 60  
  **Holt**  
  (1d, 1e) pp. 340-341  
B. Sample Activities Aligned to the Standards  
  **Holt Activities**  
  (1d, 1e) Skills Practice Lab “Detecting Acceleration, p. 356  
  (1d, 1e) Velocity Poster, TE p. 340  
  (1d, 1e) CD, Roller Coaster Lab  
  **LAUSD Force and Motion Immersion Unit**  
  (1d, 1e) Lesson 2.1 Velocity & Vectors  
  **STC/MS Energy, Motion, and Machines**  
  (1d, 1e) Part 3, Lessons 18, 19, & 21  
  (1d, 1e) Part 3, Lessons 18, 19, & 21

**Grade 8 Instructional Component 1 Content Standard Group 4**

**Standards for Component 1 Standard Group 4:**  
1f. *Students know* how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction. (Framework pp. 128-129)  

**Key Concept for Component 1 Standard Group 4:** The motion of an object in a single direction can be interpreted from graphs of position or speed versus time

<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Analyzed Standard</th>
</tr>
</thead>
</table>
**Group 1f**

- Students create and interpret graphs of distance vs. time to examine the velocity of an object.
- Students determine whether an object is speeding up, slowing down, moving towards or away from the point or origin by analyzing the slope of the line in distance vs. time graph.
- Students create and interpret graphs of speed vs. time to examine the changes in velocity (acceleration) of an object’s motion.

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**Sample Performance Task**

Student writes a report about the speed of an object. Student holds a ramp (e.g., wrapping paper tube or foam pipe insulation cut in half) at an angle and rolls a marble down the ramp. Student collects and records data of distance and time measurements at regular distance intervals along the ramp. Student calculates average speed at the different distance intervals and then creates two graphs: a *position (distance) vs. time* and a *speed vs. time* graph of the motion of the marble as it gains speed rolling down the ramp.

Student report should include:
- detailed procedures
- data table,
- calculations for speed and average speed,
- Distance/Time graph, and a speed/time graph
- calculation of slope,
- analysis comparing and contrasting the distance/time and speed/time graphs
- discussion (conclusion) - explanation of the speed of the marble as it is rolling down the ramp

**Sample Scoring Criteria for Performance Task**

Student lab report should include:
- detailed procedures
- data table,
- calculations for speed and average speed,
- Distance/Time graph, and a speed/time graph
- calculation of slope,
- analysis - describe the motion of the object on both the distance/time and speed/time graphs
- discussion (conclusion) - explanation of the speed of the marble as it is rolling down the ramp

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**

- Review distance measurement (TPS)
- Review measuring time with a stopwatch (TPS)
- Review graphing in a Cartesian coordinate system (Cooperative groups) (graphic organizing)
• Interpreting distance/time graphs (straight line equals constant speed, horizontal line equals object has stopped) (academic language) (instructional conversation) (cooperative groups)
• Interpreting speed/time graph (upward line = increasing speed, downward line = decreasing speed, horizontal line = constant speed) (academic language) (instructional conversation) (cooperative groups)
• Review speed and velocity changes (instructional conversation)
• Review writing a procedure and making a data table (instructional conversation)
• Review how to research, organize, write, and edit a report according to the teacher’s specifications (academic language) (instructional conversation)

Possible Standards Aligned Resources
A. References from State-Adopted Textbooks

Glencoe
(1f) pp. 64-71, 78
(9d) pp. 66-67
(9g) pp. 68-71

Holt
(1f) pp. 339, 342

B. Sample Activities Aligned to the Standards

Glencoe Activities
(1f, 9e) What can you learn from a graph?, p. 73
(1f, 9e) Design you own lab, graphing motion, p. 75

Holt Activities
(1f, 9d, 9e) Acceleration Poster, TE p. 342
(1f, 9e) Quick Lab-Graphing Acceleration, p. 342

LAUSD Force and Motion Immersion Unit
(1f) Lesson 2.2 Pinewood Racer

STC/MS Energy, Motion, and Machines
(1f) Part 3, Lesson 18
Grade 8 Instructional Component 1 Content Standard Group 5

Standards for Component 1 Standard Group 5:
2a. *Students know* a force has both direction and magnitude. (Framework pp. 129-130)

**Key Concept for Component 1 Standard Group 5:** Direction and magnitude are characteristics of forces.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a</td>
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<td></td>
</tr>
</tbody>
</table>

- Students identify a force as a push or a pull acting on an object
- Students illustrate forces acting on an object by using vectors
- Students judge the magnitude of a force by comparing and contrasting the length of the vector which describes the force
- Students illustrate forces acting in opposite directions to each other by assigning a

**Sample Performance Task**
Student makes a diagram with an explanation describing the forces between opponents in two *tug-of-war* scenarios where A) one side wins, and B) no side wins. Student should make a diagram for each scenario and show forces with vector arrows where relative magnitude is shown by relative vector length, and direction is shown by vector direction. A written explanation should describe the relative magnitudes, directions of the forces, the net force and direction of movement for each scenario. (2a)

**Sample Scoring Criteria for Performance Task**
Student product should include a labeled diagram for each scenario with horizontal vector arrows in opposite directions, with a larger vector arrow in the direction of the winning side in scenario A, and equal vector arrows in scenario B. Explanation should describe directions, relative magnitude of forces, net force and direction of movement in both scenarios.

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**
- Forces, magnitudes of forces, and directions of forces (cooperative groups for labs) (academic language)
- Vector arrows to represent force magnitude and direction (cooperative groups for labs) (academic language)
- Net force and direction of movement (cooperative groups for labs) (academic language)
- Explanation of *tug-of-war* if necessary (instructional conversation)

**Possible Standards Aligned Resources**
A. References from State-Adopted Textbooks
   Glencoe
negative and positive sign to the magnitude of the vector.

Holt
(2a) pp. 88, 89

B. Sample Activities Aligned to Standards

Glencoe Activities
(2a) Launch Lab-Can you feel the force?, p. 85

Holt Activities
(2a, 2b) Quick Lab-Finding Net Force, p. 346
(2a) Quick Lab-Feeling Friction, p. 351
(2a, 2b, 2c, 2d) Quick Lab-Identifying Forces, p. 348
(2a, 2b, 2e) Quick Lab-Parachutes & Air Resistance, p. 379

LAUSD Anchor Activities
(2a, 2b, 2c, 2e, 2f ) Simple Machines

STC/MS Energy, Motion, and Machines
(2a) Part 1, Lesson 5; Part 3, Lessons 18, 19, & 21

Grade 8 Instructional Component 1 Content Standard Group 6

Standards for Component 1 Standard Group 6:
2b. Students know when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces. (Framework p. 130)
2d. Students know 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. (Framework p. 131)

Key Concept for Component 1 Standard Group 6: When two or more identifiable forces act on a single static object, the result is a cumulative effect of all the forces.
<table>
<thead>
<tr>
<th>2b, 2d</th>
<th>Students determine the net force acting on an object after algebraic evaluation of the magnitudes of the vectors (2b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Students calculate (algebraically) and illustrate the resultant force vector acting on an object, where forces acting in the same line and at the same time are acting on an object (2b)</td>
<td></td>
</tr>
<tr>
<td>• Students determine whether a force applied to a static object can be classified as gravitational,</td>
<td></td>
</tr>
<tr>
<td><strong>Sample Performance Task</strong></td>
<td></td>
</tr>
<tr>
<td>Student makes a drawing of a book resting on a meter stick suspended between two student desks. Student draws and labels vector arrows where force magnitude is shown by vector length, and vector direction shows force direction. Labels should identify the type of force (i.e., gravity, tension, compression, or friction). Student writes an explanation describing the types of forces involved and gives evidence for why they are equal or unequal. (2a, 2b, 2d)</td>
<td></td>
</tr>
<tr>
<td><strong>Sample Scoring Criteria for Performance Task</strong></td>
<td></td>
</tr>
<tr>
<td>Student product should include a labeled drawing of the book on the meter stick, including a downward gravity vector, and an equal-length upward tension vector from the meter stick. Explanation should describe the origin of the opposing forces and provide evidence that they are equal.</td>
<td></td>
</tr>
<tr>
<td><strong>Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task</strong></td>
<td></td>
</tr>
<tr>
<td>• Review forces, magnitudes of forces, and directions of forces (instructional conversation) (academic language)</td>
<td></td>
</tr>
<tr>
<td>• Review use of vector arrows to represent force magnitude and direction (instructional conversation)</td>
<td></td>
</tr>
<tr>
<td>• Gravity, tension, compression, and friction (cooperative groups – labs) (instructional conversation)</td>
<td></td>
</tr>
<tr>
<td><strong>Possible Standards Aligned Resources</strong></td>
<td></td>
</tr>
<tr>
<td>A. References from State-Adopted Textbooks</td>
<td></td>
</tr>
<tr>
<td><strong>Glencoe</strong></td>
<td></td>
</tr>
<tr>
<td>(2b) pp. 90-91</td>
<td></td>
</tr>
<tr>
<td>(2d) pp. 96, 99, 101-103</td>
<td></td>
</tr>
<tr>
<td><strong>Holt</strong></td>
<td></td>
</tr>
<tr>
<td>(2b) pp. 345-346</td>
<td></td>
</tr>
<tr>
<td>B. Sample Activities Aligned to the Standards</td>
<td></td>
</tr>
<tr>
<td><strong>Glencoe Activities</strong></td>
<td></td>
</tr>
<tr>
<td>(2a, 2d) Mini lab–Can you measure the force of friction?, p. 105</td>
<td></td>
</tr>
<tr>
<td>(2a, 2d) Data Lab–Can you add vertical forces?, p. 95</td>
<td></td>
</tr>
<tr>
<td>(2a, 2d) Mini Lab–Elastic Forces, p. 102</td>
<td></td>
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</tbody>
</table>
frictional, or elastic (tension or compression) (2d)

<table>
<thead>
<tr>
<th>Holt Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2a, 2b) Quick Lab-Finding Net Force, p. 346</td>
</tr>
<tr>
<td>(2a, 2b, 2c, 2d) Quick Lab-Identifying Forces, p. 348</td>
</tr>
<tr>
<td>(2a, 2b) Quick Lab-Feeling Friction, p. 351</td>
</tr>
<tr>
<td>(2b, 2d) Activity-Finger Prints, TE p. 350</td>
</tr>
<tr>
<td>(2b, 2d) School to Home comparing friction, p. 352</td>
</tr>
</tbody>
</table>

LAUSD 8th Grade Model Lesson |
(2b, 2d) Forces, Forces Every where

LAUSD Force and Motion Immersion Unit |
(2d) Lesson 3.1, Describing Forces |
(2d) Lesson 4.1, Force Stations |
(2d) Lesson 5.1, Opposing Forces |
(2d) Lesson 5.3, Frictional Forces

STC/MS Energy, Motion, and Machines |
(2b, 2d) Part 1, Lessons 5 & 6; Part 3, Lessons 19 & 21

Web Activities |

### Grade 8 Instructional Component 1 Content Standard Group 7

**Standards for Component 1 Standard Group 7:**
2c. *Students know* when the forces on an object are balanced; the motion of the object does not change. (Framework pp. 130-131)
2e. *Students know* that 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). (Framework pp. 131-132)

**Key Concept Component 1 Standard Group 7:** Unbalanced forces acting on an object change its velocity, but balanced forces do not

<table>
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<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
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9-19
| 2c, 2e | **Sample Performance Task**  
Students are given an object to place on their table. Students will produce a labeled diagram showing what happened to the object as it sits on the table. The diagram should show the forces acting on the object. Students will represent the forces with vector arrows showing magnitude and direction. Students will push the object and produce another labeled diagram showing what happens to the object as it was pushed. This diagram should show the forces acting upon the object. Students will represent the forces with vector arrows showing magnitude and direction. Students will explain when the object did not move and why it did not move. Students will also explain when the object moved and why it moved.  

**Sample Scoring Criteria for Performance Task**  
Students should have a diagram of an object sitting on the table. The diagram should include labeled vectors showing the magnitude and direction of the force. The diagram should explain that the object does not move because all the forces are balanced and the net force is zero.  

Students should have another diagram showing the object drawing in motion. This diagram should include labeled vectors showing the magnitude and direction of the forces. Students should explain that the object is in motion because a force was applied to the object and the forces are no longer balanced. Students should explain in writing or by their diagram that the object moved in the direction of the net force.  

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
- Forces, magnitudes of forces, and directions of forces  
- Use of vector arrows to represent force magnitude and direction  
- Gravity, tension, compression, and friction  
- Balanced forces produces no movement and no net forces  
- Unbalanced forces result in a net force and object will move in the direction of the net force  

**Possible Standards Aligned Resources**  
A. State Adopted Textbook References  

Glencoe  
(2c) pp. 92-93  
(2e) pp. 106-108 |
### Holt
(2c) pp. 347, 374-375, 384-385  
(2e) pp. 341, 348-349, 353, 382, 386

### B. Sample Activities Aligned to the Standards

#### Glencoe Activities
(2c, 2e) Glencoe p. 110 Mini Lab-Does water exert a force?, p. 110

#### Holt Activities
(2b, 2c, 2d, 2e) Science Friction, p. 351  
(2b, 2c, 2d, 2e) Organize Pyramid, TE p. 368  
(2e) Explore Activity-Gravity and Falling, p. 369  
(2c, 2e) Skills Practice Lab-Exploring Inertia, p. 392  
(2b, 2c, 2d, 2e) Quick Lab-Mass & Weight, p. 374

#### LAUSD Force and Motion Immersion Unit
(2e) Lesson 5.2, Unbalanced Forces  
(2e) Lesson 5.4, Change in Motion  
(2e) Lesson 5.6, Circular Motion  
(2e) Lesson 6.1, Unbalanced Forces

#### STC/MS Energy, Motion, and Machines
(2e) Part 1, Lesson 6; Part 3, Lessons 19 & 21

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**Instructional Component 1 Content Standard Group 8**

**Standards for Component 1 Standard Group 8:**
2f. *Students know* the greater the mass of an object, the more force is needed to achieve the same rate of change in motion. (Framework p. 132)

**Key Concept for Component 1 Standard Group 8:** For the same rate of change in motion, force varies directly with mass.
<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>2f</td>
<td>• Students determine that the amount of force needed to accelerate an object is directly proportional to the object’s mass&lt;br&gt;• Students determine that the acceleration of an object is directly proportional to the force applied to the object, given the mass of the object remains constant.</td>
<td><strong>Sample Performance Task</strong>&lt;br&gt;Student writes a letter to a third-grader, using diagrams and terms (other than force, mass, acceleration) that the third-grader would understand, to explain why he/she can push an empty shopping cart faster than a full shopping cart. The letter should have two labeled diagrams, for the full and empty shopping cart being pushed, along with complete explanations of the similarities and differences between the two situations. (2f)&lt;br&gt;&lt;br&gt;<strong>Sample Scoring Criteria for Performance Task</strong>&lt;br&gt;Student product should have two labeled diagrams, for the full and empty shopping cart being pushed, with complete explanations, using simple, non-scientific terms that encourages student comprehension of those terms, that if they push as hard as they can in both cases, the empty cart goes faster because it doesn’t weigh as much, so it’s easier to push, and the opposite is true for the full cart.&lt;br&gt;&lt;br&gt;<strong>Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task</strong>&lt;br&gt;• Force, mass, acceleration (cooperative groups) (academic language)&lt;br&gt;&lt;br&gt;<strong>Possible Standards Aligned Resources</strong>&lt;br&gt;A. References from State-Adopted Textbooks&lt;br&gt;Glencoe&lt;br&gt;(2f) p. 109&lt;br&gt;Holt&lt;br&gt;(2f) pp. 387-388&lt;br&gt;&lt;br&gt;B. Sample Activities Aligned to the Standards&lt;br&gt;Glencoe Activities&lt;br&gt;(2f) Glencoe Virtual Lab CD–Newton’s second law of Motion&lt;br&gt;Holt Activities&lt;br&gt;(2f) Quick Lab-Testing Newton’s Second Law, p. 338</td>
</tr>
</tbody>
</table>
Grade 8 Instructional Component 1 Content Standard Group 9

Standards for Component 1 Content Standard Group 9:
8a. *Students know* density is mass per unit volume. (Framework p. 148)
8b. *Students know* how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume. (Framework p. 148)

**Key Concept for Component 1 Content Standard Group 9:** Density is a measure of an object’s mass per unit volume

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
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</table>
| 8a, 8b                 | • Students demonstrate that density is a physical property of an object and is independent of the amount of substance being examined (8a) • Students calculate the density of an object from measurements of mass and volume taken from the | **Sample Performance Task**
Student writes a report where he/she identifies the composition of unknown objects (regular and irregular objects) by calculating its density, using measurements of mass and volume made by the student, and comparing that value to a table of known densities of materials. The report should have detailed procedures, data table density calculations. A discussion should include a comparison of densities of unknown objects to list of known densities, with an accurate identification of the unknown materials. (8a, 8b, 9b, 9f)

**Sample Scoring Criteria for Performance Task**
The report should have detailed procedures, data table, density calculations. A discussion should include a comparison of densities of unknown objects to a list of known densities, with an accurate identification of the unknown materials

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**
• Mass measurement using a balance (cooperative groups) • Measurement of liquid volume using a graduated cylinder cooperative groups)
| object (8b) | • Use of water displacement to obtain representative volumes of irregularly-shaped objects cooperative groups)  
• Measurement of rectangular solids in three dimensions with a ruler cooperative groups)  
• Use of subtraction, multiplication, division, and/or use of calculator to calculate volumes and density cooperative groups) (academic languages)  
• Writing a procedure and making a data table (instructional conversation) (graphic organizer)  
• How to research, organize, write, and edit a report according to the teacher’s specifications (instructional conversation) |

**Possible Standards Aligned Resources**

**A. References from State-Adopted Textbooks**

**Glencoe**
- (8a) pp. 130-131
- (8b) pp. 134-136, 152

**Holt**
- (8a) pp. 85, 409, 415
- (8b) pp. 80-81, 85-87

**B. Sample Activities Aligned to the Standards**

**Glencoe Activities**
- (8a, 8b) Virtual Lab CD-Sinking or Floating
- (8a, 8b) Volume equations, p. 135
- (8a, 8b) Science Concepts, TE p. 134
- (8a, 8b) Science Concepts, TE p. 136
- (8a, 8b) Applying Math, p. 138
- (8a, 8b) Data Lab-Can you calculate the density?, p. 139

**Holt Activities**
- (8a, 8b) Demonstration-Sink or Float, TE p. 86
- (8a, 8b) Quick Lab-Finding the densities of unknown metals, p. 87
(8a, 8b) Density and Buoyancy
LAUSD Anchor Activities
(8a, 8b) Density of Water
(8a, 8b) Density Blocks

STC/MS Energy, Motion, and Machines
(8a, 8b) Part 1, Lesson 2, 3, 4, 9

Web Activities
(8a, 8b)
http://www.explorelearning.com/index.cfm?method=cResource dspResourcesForCourse&CourseID=308

### Grade 8 Instructional Component 1 Content Standard Group 10

8c. *Students know* the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced. (Framework pp. 148-149)

8d. *Students know* how to predict whether an object will float or sink. (Framework pp. 149-150)

**Key Concept for Component 1 Content Standard Group 10**: The upward buoyant force on an object in a fluid is equal to the weight of the displaced fluid, and the relative densities of the object and the fluid determine whether an object will float or sink.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 8c, 8d                 | Students explain that the buoyant force acting on an object, immersed in a fluid, is an upward force equal to the weight of the fluid displaced by the | **Sample Performance Task**
Student writes a report of experiments made to test predictions of whether rectangular solid objects will float or sink (or float at different depths). Student first makes mass and volume measurements of objects (e.g., blocks, candy bars), and then calculates their densities. Based upon comparison of object densities to the density of water, student writes predictions of whether objects will float, sink, or be neutrally buoyant, and then tests predictions by placing objects in water. Student then writes observations of relative buoyancy of objects, and compares experimental results to prior predictions. Student report should have a description of the procedure used to obtain and process data, data table with data, calculation results for densities of the objects, and a discussion that includes a comparison of the densities |
Students explain that the buoyant force acting on an object opposes the force of gravity acting on the object and the magnitude of the buoyant force depends on the difference between the object’s density and the density of the fluid in which the object is immersed (8c).

Students predict whether an object will float or sink by comparing the object’s density to the density of the fluid in which the object is immersed. (8d)

### Sample Scoring Criteria for Performance Task

Student product should have float/sink predictions for the objects, a description of procedure used to obtain and process data, data table with data, calculation results for densities of the objects, results of buoyancy tests, and a discussion comparing predictions to buoyancy test results.

### Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task

- Mass measurement using a balance (cooperative groups)
- Measurement of rectangular solids in three dimensions with a ruler (cooperative groups)
- Use of subtraction, multiplication, division, and/or use of calculator to calculate volumes and density (cooperative groups) (instructional conversation) (academic language)
- Density of water, and relative buoyancy of objects placed in water due to their densities (cooperative groups) instruction (academic language)
- Writing a procedure and making a data table (instructional conversations), (graphic organizer)
- How to research, organize, write, and edit a report according to the teacher’s specifications (instructional conversation) (academic language)

### Possible Standards Aligned Resources

**A. References from State-Adopted Textbooks**

- **Glencoe**
  - (8c) pp. 146-149
  - (8d) pp. 150-153

- **Holt**
  - (8c) pp. 412-414
  - (8d) p. 87

**B. Sample Activities Aligned to the Standards**

- **Glencoe Activities**
  - (8c) Mini Lab-Can you feel the buoyant force?, p. 149
<p>| | |</p>
<table>
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</table>
|   | (8d) Investigation Lab-Home made hydrometer, pp. 156-157  
Holt Activities  
(8d) Quick Lab-Will it sink or float?, p.416  
(8c, 8d) Skills Practice Lab-Fluids, Force, and Floating, p. 421  
(8d) Website for density and buoyancy  
LAUSD/S.C.A.L.E. Immersion Unit  
(8a, 8b) Density and Buoyancy  
LAUSD Anchor Activities  
(8a, 8b, 8c, 8d, 9d, 9e, 9f, 9g) Density of Water  
(8a, 8b, 8c, 8d) Density Blocks  
STC/MS Energy, Motion, and Machines  
(8d) Part 1, Lesson 3  
Web Activities  
(8d)  
**LAUSD- Middle School Instructional Guide**  
Eighth Grade Science  
**Instructional Component 2 – Structure of Matter, Reactions, Periodic Table, Investigation and Experimentation: Standard Sets 3, 5, 7, and 9**

### Standards for Instructional Component 2

**Standard Set 3: Structure of Matter**  
Each of the more than 10 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept:

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

**Standard Set 5: Reactions**  
Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept:

5a. Students know reactant atoms and molecules interact to form products with different chemical properties.
5b. Students know 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.
5c. Students know chemical reactions usually liberate heat or absorb heat.
5d. Students know physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
5e. Students know how to determine whether a solution is acidic, basic, or neutral.

**Standard Set 7: Periodic Table**  
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:

7a. Students know how to identify regions corresponding to metals, nonmetals, and inert gases.
7b. Students know 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.

7c. Students know substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity.

**Standard Set 9: 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.*

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

**Grade 8 Instructional Component 2 Content Standard Group 1**

**Standards for Component 2 Standard Group 1:**
3d. *Students know* the states of matter (solid, liquid, and gas) depend on molecular motion. (Framework pp. 135-136)
3e. *Students know* 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. (Framework pp. 136-137)
5d. *Students know* physical processes include freezing and boiling, in which a material changes form with no chemical reaction. (Framework p. 142)

**Key Concept for Component 2 Standard Group 1:** States of matter are dependent upon molecular motion and compactness of particles, and changes of state are not chemical changes.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
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</table>

9-29
| 3d, 3e, 5d | • Students compare and contrast molecular motion, attraction and distance between molecules for solid, liquid, and gas  
• Students match temperature with the average molecular energy of motion (kinetic energy) at one atmospheric pressure  
• Students identify that physical changes (e.g. states of matter) do not involve chemical reactions  
• Students carry out investigations that demonstrate  |
| Sample Performance Task  
LAUSD Model Lesson : Matter Matters  
Students in groups will choose how to kinesthetically represent the solid, liquid and gas states. From a list of elements or compounds and make labeled diagrams illustrating particle motion, for the selected element or compound. They will also perform the different states and explain their rationale. Students will make a graphic organizer which includes labeled diagrams of the particle motion of different states. The diagrams should include labels for the appropriate freezing, melting, and boiling points. Diagrams should show the chosen molecule in appropriate molecular motion arrangements for solid, liquid, and gas phases, illustrate changes between phases, and include a written explanation of particle motion in the three phases, and between phases. (3d, 3e)  
Sample Scoring Criteria for Performance Task  
Verbal explanations and performances should reflect student understanding of changes in motion and arrangement of particles during and between phases. Student product should include labeled diagrams showing chosen molecule molecules in appropriate molecular motion arrangements for solid, liquid, and gas phases. Graphic organizers should illustrate transitions between phases showing that the molecular structure remains constant throughout the process. Explanation should reflect student understanding of changes in motion and arrangement of particles between phases, but constancy of molecular structure.  
Differentiated Activity (Advanced): Students choose and represent molecules instead of individual atoms in performance during the above tasks.  
Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task  
• Use of the Periodic Table to name elements  
• All matter is made of atoms  
• Elements and compounds  
• Phase changes and particle motion  
• Boil water and melt ice  
• Show a phase change that isn’t water (examples: Dry ice, videos of metals melting)  
• Thermal expansion (Ball and ring, balloon over soda bottle in hot and cold)  
• Review thermal and kinetic energy |
that physical changes are reversible

Possible Standards Aligned Resources
A. References from State-Adopted Textbooks

Glencoe
(3d) pp.256-260, 261–263, 270-271
(3e) p. 264
(5d) pp. 264-269, 272-273

Holt
(3d) pp. 110-113, Chapter Summary, p. 123
(5d) pp. 94, 95, 115-119.

B. Sample Activities Aligned to the Standards
Holt Activities
(3d) Skills Practice Lab-Boiling and Temperature, pp. 120-121

STC/MS Properties of Matter
(3d, 3e, 5d) Part 1, Lessons 6 & 7

Grade 8 Instructional Component 2 Content Standard Group 2

Standards for Component 2 Standard Group 2:
3f. Students know how to use the periodic table to identify elements in simple compounds. (Framework p. 137)
7a. Students know how to identify regions corresponding to metals, nonmetals, and inert gases. (Framework pp. 145-146)
7c. Students know substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity. (Framework pp. 146-147)

Key Concept for Component 2 Standard Group 2: Elements can be classified by their properties, and the Periodic Table is a way to identify and group elements by their properties

<table>
<thead>
<tr>
<th>Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>3f, 7a, 7c</td>
<td>Students identify elements in</td>
<td>Sample Performance Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Student in small groups, students researches physical properties (appearance, melting point, density, state),</td>
</tr>
<tr>
<td>simple compounds (NaCl, H₂O) (3f)</td>
<td>atomic number, symbol, name, and atomic weight of an assigned element and makes a 3-D representation of that element (sample of element or object containing the element). The 3-D representation will go on a 25 cm x 25 cm card that includes all of the above information. Each card will be placed correctly on the classroom periodic table where the metals, nonmetals and semimetals are distinguished by color. (3f, 7a, 7c) Alternatively, assign more advanced learners elements with higher atomic numbers and multiple elements. More advanced students can research common products and uses of their element.</td>
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</tbody>
</table>
| • Students identify atomic number, symbol, name and atomic weight (3f) Students identify where metals, nonmetals, semimetals are on the periodic table (7a) | Sample Scoring Criteria for Performance Task
Student product should include physical properties, atomic number, symbol, name, atomic weight, and a 3D representation of the assigned element. Card should have attractive design and appropriate color for class periodic table group. |
| • Students classify metals, nonmetals (include explanation of why noble gases are called inert gases), semimetals by their physical properties (i.e. thermal conductivity, electrical conductivity, melting) | Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task
- The location of metals, nonmetals, and semimetals in the Periodic Table
- Atomic number, symbol, name, and atomic weight of elements in the Periodic Table
- Teacher should direct students to sources of information about physical properties of elements and examples of common objects containing various elements (e.g., CRC handbook)
  - Pencil graphite vs. lead
  - Different types of periodic tables |
| Possible Standards Aligned Resources
A. References from State-Adopted Textbooks
   Glencoe
   (3f) pp. 195-196, 290-293
   (7a) pp. 294-298, 306-309
   (7c) pp. 313-317, 338-343, 386
   Holt
   (3f) pp. 194-195, 262-265
   (7a) pp. 196-199, 202-208, 240-241
   (7c) pp. 85, 282-285 |
| temperature, density, hardness) (7c) | B. Sample Activities Aligned to the Standards  
Glencoe Activities  
(3f) How do atoms differ?, p. 203  
(7c) Which parachute will drop first?, p. 319  
(7c) Investigating Physical Changes, pp. 320-321  
Holt Activities  
(7c) Classifying Substances, p. 96  
STC/MS Properties of Matter  
(7a, 7c, 3f) Part 3, Lesson 21, 22, 23  
Web Activities  
(7a, 7c, 3f) Periodic Table [www.chemicalelements.com](http://www.chemicalelements.com), [http://www.periodictable.com/](http://www.periodictable.com/) |

### Grade 8 Instructional Component 2 Content Standard Group 3

**Standards for Component 2 Standard Group 3:**  
3a. *Students know* the structure the atom and know it is composed of protons, neutrons and electrons. (Framework p. 134)  
7b. *Students know* 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. (Framework p. 146)  

**Key Concept for Component 2 Standard Group 3:** Atoms of an element have a specific number of protons (the atomic number), and electrons, and occur as isotopes, with different but specific numbers of neutrons.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 3a, 7b                 | • Students compare and contrast Rutherford’s and Bohr’s atomic models (3a) | **Sample Performance Task**  
Students create 3-D models of an atom and for more advanced learners, one of its most common isotopes. Models can be created using household items or food, representing the nucleus’ protons, neutrons, and rings containing the electrons. Since the isotopes differ by quantity of neutrons, the students may weigh the models to see that the difference in weight is what distinguishes isotopes from one another. Models should include a key for identification of particles, and the name and mass number of each isotope. |
<table>
<thead>
<tr>
<th>Students present their model to the class describing the atomic structure. (3a, 7b)</th>
</tr>
</thead>
</table>
| **Sample Scoring Criteria for Performance Task**  
Student product should be one or two labeled models, one of each isotope of an element, with proper number and arrangement of subatomic particles, differing only by number of neutrons. Subatomic particles should be differentiated in size and charge where electrons are negatively charged and smaller than protons and neutrons while protons are positively charged. Models should include a key for identification of particles, and the name and weight of each model. Presentations should include the correct use of academic language.  

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
- Elements in the Periodic Table  
- Atomic number, atomic weight, mass number, protons, neutrons and electrons, and structure of the atom  
- Isotopes  
- Different atom models  

**Possible Standards Aligned Resources**  
A. References from State-Adopted Textbooks  
   **Glencoe**  
   (3a) pp. 175, 176-178, 184-193, 200-201, 223  
   (7b) pp. 197-198, 200, 301-306  
   **Holt**  
   (3a) pp. 164-169 Structure of Matter, pp. 172-173 Sec. Review Summary  
   (7b) pgs. 174, 175-177, 200  

B. Sample Activities Aligned to the Standards  
   **Glencoe Activities**  
   (3a) Applying Math-Mass of Subatomic Particles, p. 180  
   (3a) Mini Lab-How big are the particles in an atom?, p. 181  
   (3a) Data Lab-How do atoms differ?, p. 203  

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- Students construct the Bohr atomic model with electrons in definite energy levels in orbital (3a)  
- Students construct atomic nuclei of the same element (different isotopes) (7b)  
- Students recognize that some isotopes are radioactive (e.g. Uranium) (7b)  
- Students infer not all atomic weight are in sequential order on the periodic table due to the isotopes (7b)
(3a) Design your own Lab-Build an Atom, pp. 204-205
Holt Activities
(3a) Model making Lab-Building Atomic Nuclei, p. 180-181
(7b) Quick Lab-Atomic Bead Models, p. 177

Web Activities
(7b, 3a) Website for atom structure http: www.Colorado.edu/physics/2000/applets/a2.html (or a3.html)

Grade 8 Instructional Component 2 Content Standard Group 4

<table>
<thead>
<tr>
<th>Standards for Component 2 Standard Group 4:</th>
<th>3c. Students know atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers. (Framework p. 135)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Concept for Component 2 Standard Group 4:</td>
<td>Crystals and polymers form solids by repeating patterns of atoms or molecules</td>
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</tbody>
</table>

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<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
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</table>
| 3c                     | • Students understand the repeating patterns of atoms and molecules in crystal lattices and in polymers   | **Sample Performance Task**  
Each student brings a sample of a crystalline solid and an amorphous solid from home. In groups, students choose the best two samples and create two labeled models and diagrams comparing the 3-D molecular structure of the two different compounds; using straws and marshmallows or other sticks and soft candy available, students will make a 3-D crystalline model and a 3-D non-repeating, non-crystalline model. Labels should identify each compound as crystalline or non-crystalline (amorphous solid), and give examples of real solid compounds that are similar to each of the models in the structures. Conduct a gallery walk of all posters and samples. (3c) |
| 3c                     | • Students explain how the model (3-D or 2-D) represents the crystals     | **Sample Scoring Criteria for Performance Task**  
Student product should be a poster showing two models; one orderly crystalline structure and one disordered, non-crystalline or amorphous solid. Student should place their examples of real solid compounds in front of their poster prior to the gallery walk. |
| 3c                     | • students make         | **Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task** |

| 3c                     | **Sample Performance Task**  
Each student brings a sample of a crystalline solid and an amorphous solid from home. In groups, students choose the best two samples and create two labeled models and diagrams comparing the 3-D molecular structure of the two different compounds; using straws and marshmallows or other sticks and soft candy available, students will make a 3-D crystalline model and a 3-D non-repeating, non-crystalline model. Labels should identify each compound as crystalline or non-crystalline (amorphous solid), and give examples of real solid compounds that are similar to each of the models in the structures. Conduct a gallery walk of all posters and samples. (3c) |
| 3c                     | **Sample Scoring Criteria for Performance Task**  
Student product should be a poster showing two models; one orderly crystalline structure and one disordered, non-crystalline or amorphous solid. Student should place their examples of real solid compounds in front of their poster prior to the gallery walk. |
| 3c                     | **Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task** |

9-35
crystals from a salt solution

- Students hypothesize what physical changes will occur when crystals are formed from the salt solution in the experiment

- Structure of crystal lattices and amorphous solids, and examples of both
- Examples of real crystalline solids and amorphous solids
- Molecules and compounds

**Possible Standards Aligned Resources**

A. References from State-Adopted Textbooks

**Glencoe**
(3c) pp. 232-235, 434

**Holt**
(3c) pp. 234-235, 282, 314-317, 319

B. Sample Activities Aligned to the Standards

**Glencoe Activities**
(5c) Growing Crystals, pp. 240-242

**Holt Activities**
(3c) Explore Activity-A Model of Salt, p. 281

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**Grade 8 Instructional Component 2 Content Standard Group 5**

**Standards for Component 2 Standard Group 5:**

3b. *Students know* that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements. (Framework pp. 134-135)

5b. *Students know* 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. (Framework pp. 141-142)

5a. *Students know* reactant atoms and molecules interact to form products with different chemical properties. (Framework p. 141)

**Key Concept for Component 2 Standard Group 5:** When elements combine to form compounds, or reactant molecules form products, substances with different properties are formed, but no mass is lost or gained since the number and types of atoms remains the same.

<table>
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<tr>
<th>Content Standard</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
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<tbody>
<tr>
<td>Group</td>
<td>3b, 5b, 5a</td>
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<td></td>
<td>• Students explain why some elements combine to form ionic (metals and nonmetals) and some elements combine to form covalent compounds (organic) (3b)</td>
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<td></td>
<td>• Students compare and contrast the properties of compounds and constituent atoms (3b, 5a)</td>
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<td></td>
<td>• Students identify reactants and products of chemical reactions to carry out simple experiments (5a)</td>
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<td>• Students create a diagram of a</td>
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**Sample Performance Task**

In small groups, students make a labeled diagram about the chemical reaction that happens when a match is burned, explaining the observable differences between an unlit match and a burned match. Students make observations of an unlit match (e.g., state of matter and other physical properties, possible composition, etc.), then strike the match to light it (i.e. combine it with oxygen in the air). Students make observations of the match during and after burning is complete, including the smoke and ash produced. Students then attempt to re-light ashes using another match, and make observations of results of the attempt. Students’ diagrams should include identification and descriptions, along with illustrations, of the reactants and the products in the reaction. The reactions should be drawn left-to-right as an illustrated chemical equation using words to describe the reactants and products. Captions should include an explanation of what happened, and why the match would not re-light. (5a)

**Sample Scoring Criteria for Performance Task**

Student product should depict and label the unlit match and oxygen as reactants, and smoke and ash as the products of a chemical reaction. Captions should describe the appearance and composition of the unlit match, atmospheric oxygen, and the observable products of combustion of the match (e.g., smoke and ash). The students should explain the failure of the ashes to re-light by stating that the ashes are a chemical reaction product, with different chemical properties (i.e. not flammable) than the original unlit match, which was flammable.

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**

- Chemical and physical changes
- Chemical reactions, reactants and products
- Combustion and the role of oxygen
- Conservation of mass
- Balancing chemical equations
- Review chemical formulas and equations

**Possible Standards Aligned Resources**

A. References from State-Adopted Textbooks
   Glencoe

9-37
| simple chemical reaction in to demonstrate the law of conservation of mass (5b) | (3b) pp. 218-222, 225 – 227, 350, 354  
(5a) pp. 339, 341-342,349, 354-355  
(5b) pp. 346-347, 351-355  
Holt  
(5b) pp. 262-267  
(5a) pp. 90, 92-95, 139-141, 151, 256-259, 261, 271  
B. Sample Activities Aligned to the Standards  
Glencoe Activities  
(3b) How can you model molecules?, p. 229  
(3b, 5b) Can you model the burning of methane?, p. 357  
(5a) How can you tell a chemical change from a physical change?, p. 345  
(5a) Dirty Jewelry, pp. 366-367  
(5b) Where does the tablet go?, p. 348  
Holt Activities  
(3b) Skills Practice Lab-Flame Tests, pp. 148-149  
(3b) Skills Practice Lab-Putting Elements Together, pp. 268-269  
STC/MS Properties of Matter  
(3b, 5a) Part 3, Lessons 20, 22  
(5b) Part 3, Lessons 25, 26 |

Grade 8 Instructional Component 2 Content Standard Group 6

| Standards for Component 2 Content Standard Group 6 |
| 5c. Students know chemical reactions usually liberate heat or absorb heat. (Framework p. 142) |

| Key Concept for Component 2 Content Standard Group 6: Chemical reactions liberate or absorb heat. |

<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
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</table>

9-38
<table>
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<tr>
<th>Group</th>
<th>5c</th>
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</table>
| • Students evaluate simple chemical reactions and determine whether there is a net release (exothermic) or net absorption (endothermic) of energy | **Sample Performance Task**
In small group, students develops and conduct an experiment to explore and write a report identifying and describing an endothermic and an exothermic reaction based on observations of chemical reactions. In each reaction, students will record initial temperature and final temperature readings of the solution in which the reaction takes place, and find the difference in temperature. For one reaction, students will put a small sample of calcium chloride with a small sample of baking soda in a half filled test-tube of water. For the other reaction, students will combine baking soda and vinegar in a beaker. Student reports should have the following; a description of the procedure used to obtain and process data, data table with data, calculation results for temperature changes, and a discussion with an identification of each reaction as exothermic or endothermic, with justification using data. The end result should include a lab report that contains the data, results and conclusions of the experiment produced by each student.

**Sample Scoring Criteria for Performance Task**
Student product should have the following descriptions; the procedure used to obtain and process data, data table with data, and calculation results for temperature for both reactions. Students should also identify the calcium chloride (CaCl<sub>2</sub>) and baking soda (NaHCO<sub>3</sub>) reaction as exothermic because heat is released from the system to the surroundings as indicated by a rise in temperature of the solution. Students should identify the baking soda (NaHCO<sub>3</sub>) and vinegar (CH<sub>3</sub>COOH) reaction as endothermic because heat is absorbed, as indicated by a drop in temperature in the solution. Advanced students should construct a graph of temperature vs. time and include it in their data section.

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**
- Exothermic and endothermic reactions
- Measuring temperature with a thermometer
- Writing a procedure and making a data table
- How to research, organize, write, and edit a report according to the teacher’s specifications
- How to draw and write conclusions.
- Review graphing skills.

**Possible Standards Aligned Resources**
A. References from State-Adopted Textbooks

**Glencoe**
(5c) pp. 358-364

**Holt**
(5c) pp. 93, 259-260

B. Sample Activities Aligned to the Standards

**Glencoe Activities**
(5c) How does temperature change as chemicals react?, pp. 364-365

**Holt Activities**
(5c) Quick Lab-Endothermic and Exothermic Processes, pp. 260-261

**LAUSD Anchor Activities**
(5a, 5c) Penny Experiment
(5a, 5b, 5c) Baggie Chemistry

**STC/MS Properties of Matter**
(5c) Part 1, Lesson 5

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**Grade 8 Instructional Component 2 Content Standard Group 7**

**Standards for Component 2 Standard Group 7:**
5e. *Students know* how to determine whether a solution is acidic, basic, or neutral. (Framework p. 143)

**Key Concept for Component 2 Standard Group 7:** Solutions can be identified as acidic, basic, or neutral, using pH indicators and electronic meters

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 5e                     | • Students use the pH scale to ... | **Sample Performance Task**
In small groups, students develop and conduct an experiment where they can differentiate and identify... |
determine the acidity of a solution

• Students test acidity using different indicators such as pH paper, litmus paper, indicator solutions (i.e. universal indicator, phenolphthalein, bromothymol blue)

acids from bases. Students write a report where they were assigned several common household products and identified them as either acids or bases. Given several unknown solutions, students use various indicators such as litmus paper, red cabbage juice, phenolphthalein, bromothymol blue, etc., to test the solutions, and record the results. Based upon evidence from indicators, students identify solutions as either acids or bases, and indicate the possible pH range for each solution. Be sure to make a chart that has rows for the labels for the unknown solutions (e.g., solution A, B etc.), and columns for the indicators used where you can enter the resulting color of the indicator for each solution. Add columns to record whether each solution is an acid or a base, and the pH range of each unknown solution, based upon indicator results. As a class, create a pH chart with each group’s unknown solution. Advanced students can exchange unknown solutions with other groups to retest and practice peer review. (5e, 9b)

Sample Scoring Criteria for Performance Task
Student report should have a chart for entering observations and conclusions as indicated in the performance task for the unknown solutions and their effect on indicators used. Sample household solutions are; lime juice, vinegar, baking soda solution, soap solution, etc. Students should identify each solution used as an acid or base, depending upon indicator color observations, and relate household solutions that are acids to a pH of 1-6, and bases as pH of 8-14.

Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task
• Properties of acid and bases
• pH ranges of acids and bases
• Use of a variety of indicators to identify acid and bases

Possible Standards Aligned Resources
A. References from State-Adopted Textbooks
Glencoe
(5e) pp, 394-395

Holt
(5e) pp. 286-287, 289-290, 293-294, 299

B. Sample Activities Aligned to the Standards
<table>
<thead>
<tr>
<th>Glencoe Activities</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Holt Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5e) Skills Practice Lab-Cabbage Patch Indicators, p. 296</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LAUSD Anchor Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5e, 9a, 9b) Neutralization-Acid or Base</td>
</tr>
</tbody>
</table>
Instructional Component 3 – Chemistry of Living Systems, Earth in the Solar System (Earth Science), Investigation and Experimentation: Standard Sets 4, 6 and 9

Standard Set 6: Chemistry of Living Systems (Life Science) - Principles of chemistry underlie the functioning of biological systems.
6a. Students know that 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.
6b. Students know that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.
6c. Students know that 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.

Standard Set 2: Forces – Unbalanced forces cause changes in velocity.
2g. Students know the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system.

Standard Set 4: Earth in the Solar System (Earth Science) - The structure and composition of the universe can be learned from studying stars and galaxies and their evolution.
4e. Students know the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.
4d. Students know that 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.
4c. Students know how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth.
4b. Students know that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color.
4a. Students know galaxies are clusters of billions of stars and may have different shapes.

Standard Set 9: 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.
9a. Plan and conduct a scientific investigation to test a hypothesis.
9b. Evaluate the accuracy and reproducibility of data.
9c. Distinguish between variable and controlled parameters in a test.
9d. Recognize the slope of the linear graph as the constant in the relationship \( y = x \) and apply this principle in interpreting graphs constructed from data.
9e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
9f. Apply simple mathematical relationships to determine a missing quantity in a mathematical expression, given the two remaining terms (Including speed = distance / time, density = mass / volume, force = pressure area, volume = area x height).
9g. Distinguish between linear and nonlinear relationships on a graph of data.

Grade 8 Instructional Component 3 Content Standard Group 1

**Standards for Component 3 Standard Group 1:**

6a. *Students know* that 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. (Framework pp. 143)

**Key Concept for Component 3 Standard Group 1:** The versatility of carbon atoms in bond arrangement makes carbon important in living organisms.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 6a.                    | • Students diagram or construct models of simple carbon-based molecules including the tetrahedral (e.g., methane and carbon tetrachloride), planar (e.g., formaldehyde and ethylene), and linear (e.g., acetylene and carbon dioxide) | **Sample Performance Task**
Student makes a poster of a selected common organic molecule from a provided list (e.g., octane, Freon, polyunsaturated oil, fructose, etc.). Student researches its nomenclature (what the name means), composition (number and types of atoms of elements), and molecular structure, its use by humans, and presents the poster to the class, including a model or illustration of the molecule. Poster should include the name and meaning of the name of the molecule, the chemical formula (which elements and how many of each), a drawing or model of the molecular structure with a description of the molecular shape (tetrahedral, planar, linear) and types of bonds present (single, double, triple), and how the molecule is used by people. (6a)

**Sample Scoring Criteria for Performance Task**
Poster should include the name and meaning of the name of the molecule, the chemical formula, a drawing or model of the molecular structure with a description of the molecular shape and types of bonds present, and how the molecule is used by people.

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**
Students evaluate why carbon has a central role in the chemistry of living organisms.

- Structural formulas of molecules
- Single, double, triple bonds, and tetrahedral, planar, and linear molecules
- Teacher should direct students to sources of information about common organic molecules (e.g., CRC handbook)
- How to research, organize, write, and edit a report according to the teacher’s specifications

Possible Standards Aligned Resources
A. References from State-Adopted Textbooks
   Glencoe
   (6a) pp. 428-430
   Holt
   (6a) pp. 310 -312

B. Sample Activities Aligned to the Standards
   Holt Activities
   (6a) Explore Activity-Building organic molecules, p. 309

Grade 8 Instructional Component 3 Content Standard Group 2

Standards for Component 3 Standard Group 2
6b. Students know that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. (Framework p. 144)
6c. Students know that 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. (Framework p. 144)

Key Concept for Component 3 Standard Group 2: Living things are made mostly of only a few types of elements, but many kinds of molecules, including small ones such as water and salt, and large ones such as carbohydrates, fats, proteins and DNA.
<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 6b, 6c                 | • Students identify carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur as the primary elements in the molecules that compose living organisms that make up most of the Earth’s biomass  
                       • Students distinguish between large organic molecules such as DNA, proteins, carbohydrates, and fats that make up organisms and control their biochemical reactions | **Sample Performance Task**  
Student creates a poster for one of the following types of molecules found in living things; DNA, protein, carbohydrate, or fat. Poster should have an illustration or model of the molecule showing and labeling the major structural parts (e.g., smaller molecules from which it is made). Be sure to identify the elements from which it is made. Include a paragraph where you distinguish it from the other three main types of molecules in living things, based upon its structural characteristics, and explain its role in the structure and/or biochemical function of living things. (6b, 6c)  

**Sample Scoring Criteria for Performance Task**  
Student product should have an illustration or model of the molecule showing and labeling the types of subunits that comprise the molecule (e.g., glycerol, fatty acids, amino acids, etc.). Student should list the types of elements that make up the molecule, and include an explanation of the characteristics that distinguish it from the other three main types of molecules in living things, and its role in the structure and/or biochemical function of living things.  

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**  
• Structure and function of DNA, proteins, carbohydrates, and fats  
• How to research, organize, write, and edit a report according to the teacher’s specifications  

**Possible Standards Aligned Resources**  
A. References from State-Adopted Textbooks  
Glencoe  
(6b) p. 422  
(6c) pp. 434-435, 439-441  

Holt  
(6b, 6c) pp. 314 - 317
<table>
<thead>
<tr>
<th>Students show that salt and water are required for the support of the functions of living organisms.</th>
</tr>
</thead>
</table>

B. Sample Activities Aligned to the Standards

**Glencoe Activities**
- (6c) Lab-Which fat is healthy for you?, p. 443
- (6c) Lab-Polarity and Living systems, pp. 444-445
- (6b) Launch Lab-What is a life chemical?, p. 419

**Holt Activities**
- (6b, 6c) Skills Practice-Enzymes in Action, pp. 320-321

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**Grade 8 Instructional Component 3 Content Standard Group 3**

**Standards for Component 3 Standard Group 3:**
- 2g. *Students know* the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system. (Framework pp. 132-133)
- 4e. *Students know* the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids. (Framework pp. 139-140)
- 4c. *Students know* how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth. (Framework p. 138)

**Key Concept for Component 3 Standard Group 3:** Objects in the Solar System have a wide variety of characteristics, have shapes and motions influenced by gravity, and have distinctive units for distance measurement.

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
</tr>
</thead>
</table>
| 2g, 4e, 4c             | • Students evaluate the effects of gravity on the formation and maintenance of the solar system and the spherical shape of planets and stars | **Sample Performance Task**
  Student constructs a scale model of the Solar System on adding machine roll paper representing the relative positions of the Sun and planets. Draw the Sun at one end of the paper, use 10 cm to represent the distance from the Sun to the Earth (one astronomical unit, AU), and calculate and represent the scale distances to the other planets in scale model AU. Be sure to label all planets and their distances from the Sun in AU. (4c, 4e)

**Sample Scoring Criteria for Performance Task**
Student product should have planets in the following scale distances from the Sun: Mercury 3.8 cm,
<table>
<thead>
<tr>
<th>Students identify the nine planets in the solar system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students distinguish between the relative sizes, composition and appearance of the planets</td>
</tr>
<tr>
<td>Students differentiate between the periods of revolution and rotation of the nine planets in the solar system</td>
</tr>
<tr>
<td>Students demonstrate that the axis of the planets may be tilted, and that the tilt of the Earth’s axis causes the seasons</td>
</tr>
</tbody>
</table>

Venus 7.2 cm, Earth 10 cm, Mars 15.2 cm, Jupiter 51.8 cm, Saturn 95.1 cm, Uranus 191.4 cm, Neptune 299.8 cm, Pluto 394.2 cm. Planets should have correct names and distances labeled in AU.

**Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task**
- Astronomical units and relative positions/distances of planets
- Metric measurement, scale model calculations
- Making a data table

**Standards Aligned Resources**

A. References from State-Adopted Textbooks

<table>
<thead>
<tr>
<th>Glencoe</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2g) pp. 97, 467-470, 519-521</td>
</tr>
<tr>
<td>(4e) pp. 462-493</td>
</tr>
<tr>
<td>(4c) pp. 466-467, 479, 481, 509, 513-514, 531</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Holt</th>
</tr>
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<tbody>
<tr>
<td>(2g) Holt pp. 372 – 373, 456, 472 – 474</td>
</tr>
<tr>
<td>(4e) Holt pp. 480 – 505</td>
</tr>
<tr>
<td>(4c) Holt pp. 441, 478</td>
</tr>
</tbody>
</table>

B. Sample Activities Aligned to the Standards

**Glencoe Activities**

| (9b, 9c) Launch Lab-How do you measure distance?, p. 459 |
| (2g) Parts of an Elliptical Orbit, p. 471 |
| (4e) Data lab-How large are the planets?, p. 485 |
| (4c) Lab-Model of the Solar system, pp. 494-495 |

**Holt Activities**

| (2g) Exploring Activity-Measuring Space, TE p. 471 |
| (4e) Inquiry Lab-Motivate: Weight on each planet, TE p. 506 |
| (4e) Quick Lab-Distances of the inner solar system, distance of the outer solar system, pp. 484, 490 |

LAUSD/BSCS Astronomy Model Lessons
• Students recognize that Johannes Kepler described the motion of the planets as elliptical orbits.

• Students explain that objects orbiting the planets are satellites called moons.

• Students compare and contrast the composition and orbits of asteroids and comets.

• Students explain that the astronomical unit (AU) is the distance from the Sun to the Earth (1.496 x 10^{11} meters) and create a diagram or construct a

(2g, 4e, 4c) The Stars

LAUSD Anchor Activities
(4e) BOOM! Crater Formation

STC/MS Earth in Space
(4e) Part 1, Lessons 1 & 2; Part 2, Lessons 10 – 15, Part 3, Lessons 17, 19, 22

Web Activities
(4e) http://seds.lpl.arizona.edu/nineplanets/nineplanets/nineplanets.html
(4e) http://spacelink.nasa.gov/extra/
(4e) http://www.nineplanets.org/
(4e) http://www.astronomynotes.com/
(4e) http://planetary.org/mars/
(4e) http://www.nasa.gov/
model showing the relative position of the planets in the solar system.

Grade 8 Instructional Component 3 Content Standard Group 4

Standards for Component 3 Standard Group 4:
4d. *Students know* that 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. (Framework p. 139)
4b. *Students know* that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color. (Framework p. 138)
4a. *Students know* galaxies are clusters of billions of stars and may have different shapes. (Framework p. 139)

Key Concept for Component 3 Standard Group 4: Stars, like the Sun, produce light that planets reflect, vary in size, color, and temperature, and are grouped into galaxies of differing shapes, including our own Milky Way

<table>
<thead>
<tr>
<th>Content Standard Group</th>
<th>Analyzed Standard</th>
<th>Instructional Resources</th>
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</thead>
<tbody>
<tr>
<td>4d, 4b, 4a</td>
<td>• Students explain how nuclear fusion produces light from stars&lt;br&gt;• Students infer that the phases of the moon show evidence that the planets and their moons reflect sunlight and do not generate</td>
<td><strong>Sample Performance Task</strong>&lt;br&gt;Student selects a variety of stars and galaxies (or other space objects) from a list and creates a set of trading cards with the name and a picture of the object on one side, and the composition, size, location, appearance, position, and other interesting facts on the other side. (4a, 4b, 4d, 4e)&lt;br&gt;&lt;br&gt;<strong>Sample Scoring Criteria for Performance Task</strong>&lt;br&gt;Student product should have an illustration or picture of the object together with the name of the object on one side, with the composition, size, location, appearance, position, and other interesting facts on the other side.&lt;br&gt;&lt;br&gt;<strong>Some Suggested Concepts and Skills to Support Student Success on the Sample Performance Task</strong>&lt;br&gt;• Stars, galaxies, and other space objects&lt;br&gt;• Layout and design of trading cards (e.g., sports)</td>
</tr>
<tr>
<td>light</td>
<td>• Use of a computer and the Internet to obtain graphics and/or information, if used</td>
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<tr>
<td>• Students recognize that the Sun is a star</td>
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<tr>
<td>• Students relate the color of a star to its relative surface temperature</td>
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<tr>
<td>• Students relate star size, color, and surface temperature to stages and differences in the life cycle of stars</td>
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<tr>
<td>• Students describe distances between stars in light years; how far light travels in one year, approximately 6 trillion miles</td>
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<tr>
<td>• Students use light years to locate the sun on</td>
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</tbody>
</table>

**Standards Aligned Resources**

A. References from State-Adopted Textbooks

**Glencoe**

(4d) pp. 474-476, 508, 510-516, 519-520, 522

(4b) pp. 508-516, 530

(4a) pp. 528-532

**Holt**

(4b) p. 444

(4a) p. 450

(4d) p. 436

B. Sample Activities Aligned to the Standards

**Glencoe Activities**

(4b) Data lab-Can you identify elements in a star?, p. 517

(4d) Virtual lab-Moon Phases

(4d) How does the moon change the shape in the sky?, p. 477

**Holt Activities**

(4d) Quick Lab-Eclipses, p. 495

(4b) Skills Practice Lab-Red Hot, or Not?, pp. 458-459

**LAUSD/BSCS Astronomy Model Lessons**

(4d, 4a, 4b) The Stars

**Web Activities**

(4d, 4b, 4a) [http://spacelink.nasa.gov/extra/](http://spacelink.nasa.gov/extra/)

(4d, 4b, 4a) [http://www.sec.noaa.gov/info/School.html](http://www.sec.noaa.gov/info/School.html)

(4d, 4b, 4a) [http://www.astronomynotes.com/](http://www.astronomynotes.com/)

(4d, 4b, 4a) [http://spaceweather.com/](http://spaceweather.com/)
| the rim of a spiral galaxy called the Milky Way, orbiting the center | (4d, 4b, 4a) [http://hubblesite.org/](http://hubblesite.org/)  
| - Students classify galaxies (clusters of stars) by their shapes. | (4d, 4b, 4a) [http://www.nasa.gov/](http://www.nasa.gov/)  
| | (4d, 4b, 4a) [http://chandra.harvard.edu/xray_sources/blackholes.html](http://chandra.harvard.edu/xray_sources/blackholes.html)  
| | (4d, 4b, 4a) [http://sohowww.nascom.nasa.gov/](http://sohowww.nascom.nasa.gov/)  
|
Density and Buoyancy: What Makes Things Float?

8th Grade Physical Science Immersion Unit

This draft document is the result of several months of writing and discussion as part of the SCALE Math and Science Partnership. It is a living document open to change based on feedback from pilot testing and input. It is intended to be circulated for consultation to the SCALE community and other interested parties. A final version will be made available near the end of the SCALE project in 2007. To check on the latest version or to offer comments/suggestions regarding the content of this document, please contact your Local District Science Personnel or MST Center Science Personnel.
Density and Buoyancy:
What Makes Things Float?

This Grade 8 Immersion Unit is being developed in partnership with the Los Angeles Unified School District and is being tested and revised by teachers, scientists, and curriculum developers associated with the NSF-funded Math/Science Partnership, System-wide Change for All Learners and Educators (SCALE) and the DOE-funded Quality Educator Development (QED) project at the California State University – Dominguez Hills.

Immersion Units provide a coherent series of lessons designed to guide students in developing deep conceptual understanding that is aligned with the standards and key concepts in science. In Immersion Units, students learn academic content by working like scientists: making observations, asking questions, doing further investigations to explore and explain natural phenomena, and communicating their results based on evidence.

The preparation of this report was supported by a grant from the National Science Foundation to the University of Wisconsin–Madison (EHR 0227016). At UW–Madison, the SCALE project is housed at the Wisconsin Center for Education Research. The other partners are the University of Pittsburgh, where the SCALE project is housed within the Learning Research and Development Center’s Institute for Learning; California State University at Dominguez Hills and Northridge; Los Angeles Unified School District; Denver Public School District; Providence Public School District; and Madison Metropolitan School District. Any opinions, findings, or conclusions are those of the author and do not necessarily reflect the view of the supporting agency.
What makes things float? This simple question opens the door to several fundamental concepts in the physical sciences, including how density and a balance of forces determine whether or not an object will float. These concepts are directly observable and can easily be investigated by 8th grade students.

In this unit, students begin by exploring the overarching question What makes things float? through a series of observations and questions about odd pairs of floating and sinking objects. The unit continues through a series of three steps in which students engage in short investigations to explain the factors that determine whether an object will sink or float. In Step 5, students are introduced to density and buoyancy in liquids and gases and the effect that temperature has on these properties. In the final step, students apply what they have learned about those factors to interpret how density and buoyancy played a role in the oil spill that followed the grounding of the Exxon Valdez tanker, a widely publicized event from 1989.

The unit’s key concepts include buoyancy and how it is a balance between the gravitational force and buoyant force; density, the relationship between mass and volume and how it is an intrinsic property of materials under stable conditions; and the influence of fluids (liquids and gases) on buoyancy. As students work out these basic principles through direct observation, testing, and measurement, they develop an enduring understanding of density and buoyancy.

Unit Key Concepts

- Buoyancy is a balance between the gravitational force and buoyant force.
- Density is the relationship between mass and volume and is an intrinsic property of materials under stable conditions.
- Fluids (liquids and gases) influence buoyancy.
Unit Standards
This Immersion Unit supports the following California science content standards:

Focus on Physical Sciences
Forces
2. Unbalanced forces cause changes in velocity. As a basis for understanding this concept:
   a. Students know a force has both direction and magnitude.
   b. Students know when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.
   c. Students know when the forces on an object are balanced; the motion of the object does not change.
   e. Students know that 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).
   f. Students know the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.

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

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 in the other three strands, students will develop their own questions and perform investigations. Students will:
   a. 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 principle in interpreting graphs constructed from data.
   e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
   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 × area, volume = area × height).
   g. Distinguish between linear and nonlinear relationships on a graph of data.
# Unit Timeline

<table>
<thead>
<tr>
<th>Step</th>
<th>Lesson</th>
<th>Time</th>
<th>Key Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Floating Puzzles</td>
<td>45 min</td>
<td>• Scientists observe natural phenomena and develop testable questions based on their observations</td>
</tr>
<tr>
<td></td>
<td>Crafting Testable Questions</td>
<td>60 min</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>Weight and Floating</td>
<td>60 min</td>
<td>• Heavy things may float or sink depending on the volume.</td>
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<tr>
<td></td>
<td>Wait, Is It Weight?</td>
<td>80 min</td>
<td>• Scientists use precise measurements to make accurate explanations.</td>
</tr>
<tr>
<td></td>
<td>Analyzing Data to Predict What Will Float</td>
<td>75 min</td>
<td>• The mass to volume ratio (density) is more important than weight, in determining if something floats.</td>
</tr>
<tr>
<td></td>
<td>Challenge #1—Using What We Know about Floating and Sinking</td>
<td>45 min</td>
<td>• Objects with a density less than the density of water (1g/cm³) will float in water at some level.</td>
</tr>
<tr>
<td></td>
<td>Challenge #2—Irregular Shapes</td>
<td>30 min</td>
<td>• Under stable conditions, the density of a substance is a property of that substance and does not change.</td>
</tr>
<tr>
<td>Step 3</td>
<td>Measuring Objects that Sink</td>
<td>45 min</td>
<td>• When an object is submerged, it displaces a volume of liquid equal to its own volume.</td>
</tr>
<tr>
<td></td>
<td>Challenge #2—Irregular Shapes</td>
<td>30 min</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td>Exploring Apparent Weight &amp; Buoyancy</td>
<td>60 min</td>
<td>• Gravity pulls down on all objects at a rate of 9.81 m/sec².</td>
</tr>
<tr>
<td></td>
<td>A Balance of Forces</td>
<td>60 min</td>
<td>• An object appears lighter (is buoyed up) in a fluid by an amount equal to the buoyant force.</td>
</tr>
<tr>
<td></td>
<td>Predicting Payloads and Challenge #3</td>
<td>45 min</td>
<td>• The buoyant force pushes up on all objects and equals the weight of the displaced fluid.</td>
</tr>
<tr>
<td></td>
<td>A Balance of Forces</td>
<td>60 min</td>
<td>• Buoyancy is determined by difference between gravitational force and the buoyant force. When the difference is negative, objects sink. When it is positive, objects are buoyant (rise).</td>
</tr>
<tr>
<td></td>
<td>Changing the weight, shape and density of an object affects buoyancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 5</td>
<td>Liquids and Buoyancy</td>
<td>60 min</td>
<td>• The density of liquids can change with temperature and therefore affect the buoyancy.</td>
</tr>
<tr>
<td></td>
<td>Gases and Buoyancy</td>
<td>30 min</td>
<td>• The density of gases change much more with temperature than for liquids or solids and this affects the buoyancy of objects.</td>
</tr>
<tr>
<td>Step 6</td>
<td>Evaluation: Misconceptions and Oil Spills</td>
<td>30 min</td>
<td>• Common misconceptions can be addressed using evidence-based explanations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Understanding what makes things float involves principles of density and buoyancy</td>
</tr>
</tbody>
</table>
A. References and Suggested Readings


If anybody says he can think about quantum problems without getting giddy, that only shows he has not understood the first thing about them. **Niels Henrik David Bohr** (1885-1962) Danish physicist.


Resnick, L.B. (1992) From protoquantities to operators: Building mathematical competence on a foundation of everyday knowledge. Analysis of arithmetic for mathematics teaching (pp 373 – 429)

Hillsdale, NJ Erlbaum.


If anybody says he can think about quantum problems without getting giddy, that only shows he has not understood the first thing about them.

Niels Henrik David Bohr
(1885-1962) Danish physicist.
B. Culturally Responsive Suggested Readings
Compiled by Dr. Noma LeMoine, Ph.D


The District operates two Mathematics Science Technology Centers. Each center is unique, but, each has an extensive resource library and checkout materials are available to District teachers. Center hours are Monday - Friday 8:00 A.M. - 4:30 P.M. The centers offer professional development, teachers can inquire and enroll through their Local Districts.

• Individual Teacher Usage
Teachers may access any of the District Centers and sign up to check out materials. Materials are on loan for 2 weeks and are to be returned by the teacher.

• Department Usage
Science departments may choose to transfer monies to the Van Nuys Center for the purpose of obtaining science materials. The Van Nuys Center typically stocks live supplies and dissection materials. Contact the Van Nuys Center for the appropriate forms and a list of current materials.

• Delivery Schedule for Middle Schools
Please note that this schedule is for the 2007-2008 school year and will be revised for each school year. Order forms must be received at the Van Nuys Center at least ten (10) working days prior to the posted delivery date.

LAUSP VAN NUYS MST CENTER (SCIENCE MATERIALS CENTER)
6625 BALBOA BOULEVARD, VAN NUYS, CA 91406
TELEPHONE: (818) 997-2574  FAX: (818) 344-8379

DELIVERY DATES - ROUTE 1 - 2007-2008
Order forms must be received at the Van Nuys Center at least ten (10) working days prior to the required delivery date. The delivery day for Route 1 will normally be Tuesday.

<table>
<thead>
<tr>
<th>September 11</th>
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<tr>
<td>September 25</td>
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<td>November 6</td>
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<td>November 27</td>
<td>March 11</td>
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<tr>
<td>December 11</td>
<td>June 10</td>
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COLUMBUS M.S.
FROST M.S.
HALE M.S.
HENRY M.S.
HOLMES M.S./MAGNET
LAWRENCE M.S.
MULHOLLAND M.S.
DISTRICT 1 OFFICE

NOBEL M.S./MAGNET
NORTHRIDGE M.S.
PORTER M.S./MAGNET
PORTOLA M.S./MAGNET
SHERMAN OAKS CES
SUTTER M.S.
WOODLAND HILLS ACADEMY

11-4
DELCIVERY DATES - ROUTE 2 - 2007 - 2008
Order forms must be received at the Science Materials Center at least ten (10) working days prior to the required delivery date. The delivery day for Route 2 will normally be Wednesday.
September 11 (Winter Break) April 2
September 26 January 16 April 16
October 10 January 30 April 30
October 24 February 13 May 14
November 7 February 27 May 28
November 28 March 12 June 22
December 12 (Spring Break)

BYRD M.S./MAGNET
FULTON M.S.
MACLAY M.S.
MADISON M.S./MAGNET
MILLIKAN M.S./MAGNET
MOUNT GLEASON M.S.
OLIVE VISTA M.S.

PACOIMA M.S./MAGNET
REED M.S.
SAN FERNANDO M.S.
SEPULVEDA M.S./MAGNET
SUN VALLEY M.S.
VAN NUYS M.S./MAGNET
VISTA M.S.
DISTRICT 2 OFFICES

DELCIVERY DATES - ROUTE 3 - 2007 - 2008
Order forms must be received at the Science Materials Center at least ten (10) working days prior to the required delivery date. The delivery day for Route 3 will normally be THURSDAY.
September 12 (Winter Break) April 3
September 27 January 17 April 17
October 11 January 31 May 1
October 25 February 14 May 15
November 8 February 28 May 29
November 29 March 13 June 12
December 13 (Spring Break)

ARROYO SECO ALTERNATIVE
BELVEDERE M.S./MAGNET
BURBANK M.S.
EAGLE ROCK H.S./MAGNET
EL SERENO M.S./MAGNET
GRiffITH M.S./MAGNET
HIGHLAND PARK H.S.

HOLLENBECK M.S.
IRVING M.S.
KING M.S.
NIGHTINGALE M.S.
STEVENSON M.S./MAGNET
DISTRICT 5 OFFICES
DELIVERY DATES - ROUTE 4 - 2007 - 2008

Order forms must be received at the Science Materials Center at least ten (10) working days prior to the required delivery date. The delivery day for Route 4 will normally be Tuesday.

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<th>September 18</th>
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<tr>
<td>January 8</td>
<td>January 23</td>
<td>February 5</td>
<td>February 20</td>
<td>March 4</td>
<td>(Spring Break)</td>
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<tr>
<td>April 8</td>
<td>April 22</td>
<td>May 6</td>
<td>May 20</td>
<td>June 3</td>
<td>MARCH 25</td>
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ADAMS M.S./MAGNET
BANCROFT M.S./MAGNET
BELL #3 SPAN
BETHUNE M.S.
CARVER M.S.
CONTRERAS LC
CENTRAL LA NEW MS #4
DREW M.S./MAGNET
EDISON M.S.
ELLEN OCHOA L.C.
ELIZABETH ST. LEARNING CENTER
GAGE M.S.
LE CONTE M.S./MAGNET

DELIVERY DATES - ROUTE 5 - 2007 - 2008

Order forms must be received at the Science Materials Center at least ten (10) working days prior to the required delivery date. The delivery day for Route 5 will normally be Wednesday.

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<th>September 19</th>
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<tr>
<td>January 9</td>
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<td>February 20</td>
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<td>(Spring Break)</td>
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<tr>
<td>March 26</td>
<td>April 9</td>
<td>April 23</td>
<td>May 7</td>
<td>May 21</td>
<td>June 4</td>
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AUDUBON M.S./MAGNET
BERENDO M.S.
BURROUGHS M.S./MAGNET
COCHRAN MS (Mount Vernon)
EMERSON M.S.
FOSHAY M.S.
HARTE INTERMEDIATE
LAUSD/USC MATH SCIENCE
LOS ANGELES CES
DELIVERY DATES - ROUTE 6 - 2007 - 2008

Order forms must be received at the Science Materials Center at least ten (10) working days prior to the required delivery date. The delivery day for Route 6 will normally be Thursday.

- September 20
- October 4
- October 18
- November 1
- November 15
- December 6
- (Winter Break)
- January 10
- January 24
- February 7
- February 21
- March 6
- (Spring Break)
- March 27
- April 10
- April 24
- May 8
- May 22
- June 5

CARNEGIE M.S.
CLAY M.S.
CURTISS M.S./MAGNET
DANA M.S.
DODSON M.S./MAGNET
FLEMING M.S.

GOMPERS M.S.
PEARY M.S./MAGNET
WHITE M.S.
WILMINGTON M.S.
DISTRICT 7 OFFICES
DISTRICT 8 OFFICES
Los Angeles Unified School District
Instructional Support Services
Science Branch
333 South Beaudry Avenue, 25th Floor
Los Angeles, CA 90017
(213) 241-6880 Fax (213) 241-6940

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Hilda Tunstad, Senior Secretary
Virginia Ong, Financial Aide
Karen Jones, Administrative Analyst
Augusto Moreno, Office Technician
Don Kawano, Coordinator Middle School Science
Diane Watkins, Coordinator High School Science
Thomas Yee, Coordinator Secondary Science Professional Development
KJ Walsh, Specialist Middle School Science
Myrna Estrada, Secondary Science Expert
Elizabeth Garcia, Secondary Science Expert

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Laurence Daniel, Science Technician
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Nanette Roeland, Science Technician
Edgar Sanchez, Science Technician

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Lynne Bernstein, Life Science Lab Technician
Tim Brown, Science Technician
Ron Tatsui, Science Technician
Robert Sosa, Science Technician
Daniel Medina, Light Truck Driver
Tim Weld, Light Truck Driver
<table>
<thead>
<tr>
<th>Local District 1</th>
<th>Local District 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6621 Balboa Blvd.</td>
<td>The Academy Building</td>
</tr>
<tr>
<td>Van Nuys, CA 91406</td>
<td>5200 Lankershim Blvd.</td>
</tr>
<tr>
<td>Robert Scott, Science Specialist</td>
<td>North Hollywood, CA 91601</td>
</tr>
<tr>
<td>Larry Furukawa, Science Expert</td>
<td>Barbara Donatella, Science Expert</td>
</tr>
<tr>
<td>Phone: 818-256-2846</td>
<td>Daniel McDonnell, Science Advisor</td>
</tr>
<tr>
<td>Fax: 818-894-8236</td>
<td>Mercy Momary, Science Advisor</td>
</tr>
<tr>
<td><a href="mailto:Robert.scott@lausd.net">Robert.scott@lausd.net</a></td>
<td>Phone: 818-755-5328</td>
</tr>
<tr>
<td><a href="mailto:L.furukaw@lausd.net">L.furukaw@lausd.net</a></td>
<td>Fax: 818-755-9824</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:Barbara.donatella@lausd.net">Barbara.donatella@lausd.net</a></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:Daniel.@lausd.net">Daniel.@lausd.net</a></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:Mercy.momary@lausd.net">Mercy.momary@lausd.net</a></td>
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</table>

<table>
<thead>
<tr>
<th>Local District 3</th>
<th>Local District 4</th>
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</thead>
<tbody>
<tr>
<td>3000 Robertson Blvd., Suite 100</td>
<td>Harbor Building</td>
</tr>
<tr>
<td>Los Angeles, CA 90034</td>
<td>4201 Wilshire Blvd., Suite 204</td>
</tr>
<tr>
<td>Karen Jin, Science Specialist</td>
<td>Los Angeles, CA 90010</td>
</tr>
<tr>
<td>Valerie Cannon, Science Advisor</td>
<td>Marisa Hipol, Science Specialist</td>
</tr>
<tr>
<td>Phone: 310-253-7143</td>
<td>Angela Okwo, Science Advisor</td>
</tr>
<tr>
<td>Fax: 310-842-9170</td>
<td>Phone: 323-932-2632</td>
</tr>
<tr>
<td><a href="mailto:Karen.jin@lausd.net">Karen.jin@lausd.net</a></td>
<td>Fax: 323-932-2114</td>
</tr>
<tr>
<td><a href="mailto:Valerie.cannon@lausd.net">Valerie.cannon@lausd.net</a></td>
<td><a href="mailto:Marisa.hipol@lausd.net">Marisa.hipol@lausd.net</a></td>
</tr>
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<table>
<thead>
<tr>
<th>Local District 5</th>
<th>Local District 6</th>
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<tbody>
<tr>
<td>2151 North Soto St.</td>
<td>Bank of America Building</td>
</tr>
<tr>
<td>Los Angeles, CA 90032</td>
<td>5800 S. Eastern Ave., 5th Floor</td>
</tr>
<tr>
<td>Henry Ortiz, Science Specialist</td>
<td>City of Commerce, CA 90040</td>
</tr>
<tr>
<td>Dave Hicks, Science Expert</td>
<td>Pamela H. Williams, Science Expert</td>
</tr>
<tr>
<td>John Zavalney, Science Advisor</td>
<td>Catherine Duong, Science Advisor</td>
</tr>
<tr>
<td>Phone: 323-224-3139</td>
<td>Phone: 323-278-3932</td>
</tr>
<tr>
<td>Fax: 323-222-5702</td>
<td>Fax: 323-720-9366</td>
</tr>
<tr>
<td><a href="mailto:Henry.ortiz@lausd.net">Henry.ortiz@lausd.net</a></td>
<td><a href="mailto:Pamela.williams@lausd.net">Pamela.williams@lausd.net</a></td>
</tr>
<tr>
<td><a href="mailto:Dave.hicks@lausd.net">Dave.hicks@lausd.net</a></td>
<td><a href="mailto:Catherine.duong@lausd.net">Catherine.duong@lausd.net</a></td>
</tr>
<tr>
<td><a href="mailto:John.zavalney@lausd.net">John.zavalney@lausd.net</a></td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>10616 S. Western Ave.</td>
<td>1208 Magnolia Ave.</td>
</tr>
<tr>
<td>Los Angeles, CA 90047</td>
<td>Gardena, CA 90247</td>
</tr>
<tr>
<td>Tina Perry, Science Advisor</td>
<td>Gilberto Samuel, Science Specialist</td>
</tr>
<tr>
<td>Ayham Dahi, Science Advisor</td>
<td>Craig Yokoi</td>
</tr>
<tr>
<td>Phone: 323-242-1356</td>
<td>Phone: 310-354-3547</td>
</tr>
<tr>
<td>Fax: 323-242-1391</td>
<td>Fax: 310-532-4674</td>
</tr>
<tr>
<td><a href="mailto:Tina.perry@lausd.net">Tina.perry@lausd.net</a></td>
<td><a href="mailto:Gilberto.samuel@lausd.net">Gilberto.samuel@lausd.net</a></td>
</tr>
<tr>
<td><a href="mailto:Ayham.dahi@lausd.net">Ayham.dahi@lausd.net</a></td>
<td><a href="mailto:Craig.yokoi@lausd.net">Craig.yokoi@lausd.net</a></td>
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ALTERNATIVE CORE SCIENCE COURSE — GRADE 7

FOCUS ON LIFE SCIENCE 7
Annual Course—Grade 7

Prerequisite: None

36-01-15A FOCUS ON LIFE SCI 7A
36-01-15B FOCUS ON LIFE SCI 7B

Course Description

The major purpose of this course is to provide all students with science concepts that build upon the students’ K–6 experience. Emphasis will be placed on Investigation and Experimentation and the Science Standards which will prepare students to lead successful and productive lives and prepare them for future science courses. The middle school teacher uses a balanced (inquiry/text) approach and establishes connections between Earth/Space Science, Physical Science, Life Science, with a focus on Life Science.

COURSE SYLLABUS

Instructional Component 1:
Standard Set 1: Cell Biology- All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope. As a basis for understanding this concept:
1.a. Students know cells function similarly in all living organisms.
1.b. Students know the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
1.c. Students know the nucleus is the repository for genetic information in plant and animal cells.
1.d. Students know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.
1.e. Students know cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.
1.f. Students know that as multicellular organisms develop, their cells differentiate.

Standard Set 2: Genetics - A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept:
2.a. Students know the differences between the life cycles and reproduction methods of sexual and asexual organisms.
2.b. Students know sexual reproduction produces offspring that inherit half their genes from each parent.
2.c. Students know an inherited trait can be determined by one or more genes.
2.d. Students know plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
2.e. Students know DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

Standard Set 5: Structure and Function in Living Systems (*Note Parent permission is necessary to teach these standards that might be addressed in Health) - The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. As a basis for understanding this concept:
*5.d. Students know how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.
*5.e. Students know the function of the umbilicus and placenta during pregnancy.
5.f. **Students know** the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.

**Standard Set 6: Physical Principles in Living Systems** - Physical principles underlie biological structures and functions. As a basis for understanding this concept:

6.a. **Students know** visible light is a small band within a very broad electromagnetic spectrum.
6.c. **Students know** light travels in straight lines if the medium it travels through does not change.
6.d. **Students know** how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.
6.f. **Students know** light can be reflected, refracted, transmitted, and absorbed by matter
6.g. **Students know** the angle of reflection of a light beam is equal to the angle of incidence. 6.d. **Students know** how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.

**Standard Set 7: 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:

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

**Instructional Component 2**

**Standard Set 3: Evolution** - Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:

3.a. **Students know** both genetic variation and environmental factors are causes of evolution and diversity of organisms.
3.b. **Students know** the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.
3.c. **Students know** how independent lines of evidence from geology, fossils, and comparative anatomy provide the basis for the theory of evolution.
3.d. **Students know** how to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and how to expand the diagram to include fossil organisms.
3.e. **Students know** that extinction of a species occurs when the environment changes and that the adaptive characteristics of a species are insufficient for its survival

**Standard Set 4: Earth and Life History** - Evidence from rocks allows us to understand the evolution of life. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:

4.a. **Students know** Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.
4.b. **Students know** the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.
4.c. **Students know** that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom.
4.d. **Students know** that evidence from geologic layers and radioactive dating indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.
4.e. **Students know** fossils provide evidence of how life and environmental conditions have changed
4.f. **Students know** how movements of Earth’s continental and oceanic plates through time, with associated changes in climate and geographic connections, have affected the past and present distribution of organisms.
4.g. **Students know** how to explain significant developments and extinctions of plant and animal life on the geologic time scale.

**Standard Set 5: Structure and Function in Living Systems** - The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. Physical principles underlie biological structures and functions. As a basis for understanding this concept:

5.a. **Students know** plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.

5.b. **Students know** organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.

5.c. **Students know** how bones and muscles work together to provide a structural framework for movement.

5.g. **Students know** how to relate the structures of the eye and ear to their functions.

**Standard Set 6: Physical Principles in Living Systems** - Physical principles underlie biological structures and functions. As a basis for understanding this concept:

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

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

6.h. **Students know** 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).

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

6.j. **Students know** that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.

**Standard Set 7: 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:

7.a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data and display data.

7.b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.

7.c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.

7.d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g. motion of Earth’s plates and cell structure).

7.e. Communicate the steps and results from an investigation in written reports and oral presentations.

**Representative Performance Outcomes and Skills**

*In accordance with their individual capacity, students will grow in the ability to:*

- Use science process skills such as observing, communicating, comparing, ordering, categorizing, relating, inferring, and applying.
- Demonstrate skills in the area of speaking, listening, writing, reading, graphing and mathematics.
- Demonstrate the connections between Earth/Space Science, Physical Science, Life Science and Health.
- Demonstrate the interdisciplinary connections between the sciences and other curricular areas.
- Communicate the steps and results of investigations in written and oral presentations.
- Identify evidence that supports or opposes a proposed explanation or event.
- Investigate current significant scientific issues.
- Apply scientific inquiry and problem solving techniques projects and investigations.
- Use the metric system, scientific equipment, and technology properly to make quantitative measurements.
- Understand the significance of historical and current contributions of major scientists.
- Evaluate humans’ responsibility toward the Earth’s natural resources.
• Establish the relevance of science and its applications to careers and real-life situations.
• Evaluate the contributions of science and technology and their relevance to improving our daily lives in preparation for the future.

Assessments
Instruction in our district is assessment-driven. The Framework states "that effective science programs include continual assessment of student's knowledge and understanding, with appropriate adjustments being made during the academic year (p.11)." Assessments can be on demand or over a long period of time. The District Periodic Assessments and STAR State Testing play a significant role in Student Assessments.

The chart below, adapted from A Guide for Teaching and Learning, NRC (2000), gives some examples of on demand and over time assessment.

<table>
<thead>
<tr>
<th>On Demand</th>
<th>Over Time</th>
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<tbody>
<tr>
<td>answering questions</td>
<td>portfolios,</td>
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<tr>
<td>multiple choice</td>
<td>journals</td>
</tr>
<tr>
<td>true false</td>
<td>lab notebooks</td>
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<tr>
<td>matching</td>
<td>projects</td>
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<tr>
<td>Periodic Assessments</td>
<td></td>
</tr>
<tr>
<td>California Standards Tests</td>
<td></td>
</tr>
</tbody>
</table>

Chart 1 - Assessment Examples

Texts/Materials
• LAUSD Science Instructional Guide for Middle School Grades 6 – 8
• Science Framework for California Public Schools
• State Adopted Textbooks and ancillary materials
  • Glencoe/McGraw-Hill, Glencoe Science Focus on Earth Science, 2007
• Science Safety Handbook for California Public Schools
• Appropriate science laboratory materials
SUPPLEMENTARY ELECTIVE COURSES—MIDDLE SCHOOL

ENVIRONMENTAL SCIENCE
Semester Course—Grades 6-8
Prerequisite- Please note that students must have concurrent enrollment or have completed the core science course for that grade level (Sci/Hlth 6 AB, Science 7, Health 7, or Science 8AB). Also note that this elective is a one semester class.
Prerequisite: None

36-05-13 ENV. SCI

Course Description
The major purpose of this course is to provide experiences in the process by which scientific knowledge is gained, acquisition of skills for using inquiry and research in the scientific method and interpretation of natural phenomena in relation to the environment. Emphasis should be placed on Investigation and Experimentation and the integration of Science Content Standards.

It does not meet the District Grade 6-8 science requirement.

INSTRUCTIONAL UNITS/PACING PLAN

<table>
<thead>
<tr>
<th>INSTRUCTIONAL UNITS</th>
<th>*SUGGESTED WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro to Environmental Science (includes laboratory</td>
<td></td>
</tr>
<tr>
<td>Field studies safety)</td>
<td>1</td>
</tr>
<tr>
<td>Ecology, Major Biomes, and Wildlife</td>
<td>5</td>
</tr>
<tr>
<td>Population Studies</td>
<td>2</td>
</tr>
<tr>
<td>Soil and Water Conservation</td>
<td>2</td>
</tr>
<tr>
<td>Conservation and Management of Natural Resources</td>
<td>2</td>
</tr>
<tr>
<td>Land use</td>
<td>2</td>
</tr>
<tr>
<td>Careers in Environmental Related Fields</td>
<td>2</td>
</tr>
</tbody>
</table>

Total *16 *19

year-round traditional

* Suggested weeks are to be used as an estimate only.

INVESTIGATION AND EXPERIMENTATION
In accordance with their individual capacity, students will grow in the ability to:

• Use the science process skills of scientific thinking: observing, communicating, comparing, ordering, categorizing, relating, inferring, and applying.
• Demonstrate skills in speaking, listening, writing, reading, graphing, and charting.
• Show connections between earth/space, physical, and life science.
• Demonstrate the interdisciplinary connections between the sciences and other curricular fields.
• Investigate current significant scientific issues.
• Establish the relevance of science and its applications in careers and real-life situations.
• Evaluate the contributions of science and technology and their relevance to improving our daily lives.
• Make appropriate conclusions from experimental data gathered from laboratory investigations.
• Explain the process of natural selection and its application to population genetics.
• Plan and conduct a scientific investigation to test a hypothesis. *
• Evaluate the accuracy and reproducibility of data.*
• Distinguish between variable and controlled parameters in a test.*
• Recognize the slope of the linear graph as the constant in relationship \( y = kx \) and apply this principle in interpreting graphs constructed from data.*
• Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.*
• 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 \( \times \) area, volume = area \( \times \) height).*
• Distinguish between linear and nonlinear relationships on a graph of data.*
• Apply scientific inquiry and problem-solving techniques to long- and short-term projects.
• Analyze and evaluate the accuracy and the reproducibility of scientific reports and data.
• Use the metric system to make quantitative measurements.
• Use community resources.
• Evaluate responsibility of human beings toward the earth’s natural resources.

Note: Asterisked items are Science Investigation and Experimentation Standards for the State of California.

Assessments
Instruction in our district is assessment-driven. The Framework states "that effective science programs include continual assessment of student's knowledge and understanding, with appropriate adjustments being made during the academic year (p.11)." Assessments can be on demand or over a long period of time. The chart below, adapted from A Guide for Teaching and Learning, NRC (2000), gives some examples of on demand and over time assessment.

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• Science Safety Handbook for California Public Schools
• Appropriate science texts, periodicals, monographs, and laboratory materials
EXPLORE AERONAUTICS
Semester Course—Grades 6-8
Perquisite- Please note that students must have concurrent enrollment or have completed the core science course for that grade level (Sci/Hlth 6 AB, Science 7, or Science 8AB). Also note that this elective is a one semester class.

Prerequisite: None

36-16-13 EX. AERONAUTICS

Course Description
The major purpose of this course is to provide experiences in the process by which scientific knowledge is gained, acquisition of skills for using inquiry and research in the scientific method and interpretation of natural phenomena in relation to the environment. Emphasis should be placed on Investigation and Experimentation and the integration of Science Content Standards.

It does not meet the District Grade 6-8 science requirement.

INSTRUCTIONAL UNITS/PACING PLAN

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<th>Instructional Units</th>
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<td>Introduction to Aviation</td>
<td>2</td>
</tr>
<tr>
<td>History of Aviation</td>
<td>3</td>
</tr>
<tr>
<td>The Science of Flight</td>
<td>3</td>
</tr>
<tr>
<td>Meteorology and Aviation</td>
<td>3</td>
</tr>
<tr>
<td>Flight Planning and Implementation</td>
<td>3</td>
</tr>
<tr>
<td>Careers in Aviation</td>
<td>2</td>
</tr>
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<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
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INVESTIGATION AND EXPERIMENTATION

In accordance with their individual capacity, students will grow in the ability to:

- Use the science process skills of scientific thinking: observing, communicating, comparing, ordering, categorizing, relating, inferring, and applying.
- Demonstrate skills in speaking, listening, writing, reading, graphing, and charting.
- Show connections between earth/space, physical, and life science.
- Demonstrate the interdisciplinary connections between the sciences and other curricular fields.
- Investigate current significant scientific issues.
- Establish the relevance of science and its applications in careers and real-life situations.
- Evaluate the contributions of science and technology and their relevance to improving our daily lives.
- Make appropriate conclusions from experimental data gathered from laboratory investigations.
- Explain the process of natural selection and its application to population genetics.
- Plan and conduct a scientific investigation to test a hypothesis.*
- Evaluate the accuracy and reproducibility of data.*
- Distinguish between variable and controlled parameters in a test.*
- Recognize the slope of the linear graph as the constant in relationship y=kx and apply this principle in interpreting graphs constructed from data.*
• Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.  
• 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).  
• Distinguish between linear and nonlinear relationships on a graph of data.  
• Apply scientific inquiry and problem-solving techniques to long- and short-term projects.  
• Analyze and evaluate the accuracy and the reproducibility of scientific reports and data.  
• Use the metric system to make quantitative measurements.  
• Use community resources.  
• Evaluate responsibility of human beings toward the earth’s natural resources.

Note: Asterisked items are Science Investigation and Experimentation Standards for the State of California.

Assessments
Instruction in our district is assessment-driven. The Framework states "that effective science programs include continual assessment of student's knowledge and understanding, with appropriate adjustments being made during the academic year (p.11)." Assesments can be on demand or over a long period of time. The chart below, adapted from A Guide for Teaching and Learning, NRC (2000), gives some examples of on demand and over time assessment.

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• Science Safety Handbook for California Public Schools
• Appropriate science texts, periodicals, monographs, and laboratory materials
SUPPLEMENTARY ELECTIVE COURSES—MIDDLE SCHOOL

MARINE SCIENCE
Semester Course—Grades 6-8
Prerequisite: Please note that students must have concurrent enrollment or have completed the core science course for their grade level (Sci/Hlth 6 AB, Science 7, or Science 8 AB).

36-06-21 MARINE SCI.

Course Description
The major purpose of this course is to provide experiences in the process by which scientific knowledge is gained, acquisition of skills for using inquiry and research in the scientific method and interpretation of natural phenomena in relation to the marine environment. Emphasis should be placed on Investigation and Experimentation and the integration of Science Content Standards.

It does not meet the District Grade 6-8 science requirement.

INSTRUCTIONAL UNITS/PACING PLAN

<table>
<thead>
<tr>
<th>Instructional Units</th>
<th>Suggested Weeks</th>
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</thead>
<tbody>
<tr>
<td>Introduction to Oceans and Fish</td>
<td>2</td>
</tr>
<tr>
<td>Properties of Water- Physical/Chemical</td>
<td>2</td>
</tr>
<tr>
<td>Ocean Currents and Tides</td>
<td>1</td>
</tr>
<tr>
<td>Marine Ecology</td>
<td>2</td>
</tr>
<tr>
<td>Evolution of Oceans</td>
<td>1</td>
</tr>
<tr>
<td>Marine Invertebrates</td>
<td>2</td>
</tr>
<tr>
<td>Marine Vertebrates</td>
<td>2</td>
</tr>
<tr>
<td>Atmospheric and Oceanic Circulation</td>
<td>2</td>
</tr>
<tr>
<td>Ocean/Land Interaction</td>
<td>1</td>
</tr>
<tr>
<td>Careers</td>
<td>1</td>
</tr>
</tbody>
</table>

Total: *16 year-round *19 traditional

* Suggested weeks are to be used as an estimate only.

INVESTIGATION AND EXPERIMENTATION

In accordance with their individual capacity, students will grow in the ability to:

- Use the science process skills of scientific thinking: observing, communicating, comparing, ordering, categorizing, relating, inferring, and applying.
- Demonstrate skills in speaking, listening, writing, reading, graphing, and charting.
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- Make appropriate conclusions from experimental data gathered from laboratory investigations.
- Explain the process of natural selection and its application to population genetics.
- Plan and conduct a scientific investigation to test a hypothesis.*
- Evaluate the accuracy and reproducibility of data.*
- Distinguish between variable and controlled parameters in a test.*
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• Analyze and evaluate the accuracy and the reproducibility of scientific reports and data.
• Use the metric system to make quantitative measurements.
• Use community resources.
• Evaluate responsibility of human beings toward the earth’s natural resources.

Note: Asterisked items are Science Investigation and Experimentation Standards for the State of California.

Assessments
Instruction in our district is assessment-driven. The Framework states "that effective science programs include continual assessment of student's knowledge and understanding, with appropriate adjustments being made during the academic year" (p.11).* Assessments can be on demand or over a long period of time. The chart below, adapted from A Guide for Teaching and Learning, NRC (2000), gives some examples of on demand and over time assessment.

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• Appropriate science texts, periodicals, monographs, and laboratory materials
SUPPLEMENTARY ELECTIVE COURSE—MIDDLE SCHOOL

SPACE SCIENCE
Semester Course—Grades 6-8
Prerequisite- Please note that students must have concurrent enrollment or have completed the core science course for that grade level (Sci/Hlth 6 AB, Science 7, Health 7, or Science 8AB). Also note that this elective is a one semester class.
Prerequisite: None

36-16-11 SPACE SCIENCE

Course Description
The major purpose of this course is to provide experiences in the process by which scientific knowledge is gained, acquisition of skills for using inquiry and research in the scientific method and interpretation of natural phenomena in relation to the universe. Emphasis should be placed on Investigation and Experimentation and the integration of Science Content Standards.

It does not meet the District Grade 6-8 science requirement.

INSTRUCTIONAL UNITS/PACING PLAN

<table>
<thead>
<tr>
<th>Instructional Units</th>
<th>Suggested Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Space Science</td>
<td>1</td>
</tr>
<tr>
<td>The Earth Composition and Position</td>
<td>1</td>
</tr>
<tr>
<td>In the Universe</td>
<td></td>
</tr>
<tr>
<td>The Solar System</td>
<td>3</td>
</tr>
<tr>
<td>Astronomical Scale and Structure</td>
<td>2</td>
</tr>
<tr>
<td>Telescopes/Optics</td>
<td>1</td>
</tr>
<tr>
<td>Electromagnetic Spectrum</td>
<td>2</td>
</tr>
<tr>
<td>Gravity</td>
<td>1</td>
</tr>
<tr>
<td>Star Composition and Classification</td>
<td>1</td>
</tr>
<tr>
<td>Evolution of Stars</td>
<td>1</td>
</tr>
<tr>
<td>Galaxies, Nebula and Beyond</td>
<td>1</td>
</tr>
<tr>
<td>Space Exploration</td>
<td>1</td>
</tr>
<tr>
<td>Careers</td>
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| Total | *16 year-round | *19 traditional |

* Suggested weeks are to be used as an estimate only.

INVESTIGATION AND EXPERIMENTATION

In accordance with their individual capacity, students will grow in the ability to:

- Use the science process skills of scientific thinking: observing, communicating, comparing, ordering, categorizing, relating, inferring, and applying.
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SUPPLEMENTARY ELECTIVE COURSE—MIDDLE SCHOOL

INTERMEDIATE SCIENCE CURRICULUM STUDY AB
Annual Course—Grade 8
Prerequisite - Please note that students must have concurrent enrollment or have completed the
core science course for their grade level ( Sci/Hlth 6 AB, Science 7, or Science 8 AB).

36-01-13 ISCS A
36-01-14 ISCS B

Course Description
The major purpose of this course is to provide experiences in the process by which scientific knowledge
is gained, acquisition of skills for using the scientific method of inquiry, interpretation of natural
phenomena related to the physical sciences, and technological achievements. Emphasis should be placed
on Investigation and Experimentation and the Science Standards.

It does not meet the District Grade 6-8 science requirement.

INSTRUCTIONAL UNITS/PACING PLAN

<table>
<thead>
<tr>
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<th>Suggested Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Scientific Method</td>
<td>1</td>
</tr>
<tr>
<td>Energy, Force and Work</td>
<td>3</td>
</tr>
<tr>
<td>Atoms, Molecules and Chemical Reactions</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry and Energetics of Life</td>
<td>6</td>
</tr>
<tr>
<td>Plate Tectonics</td>
<td>5</td>
</tr>
<tr>
<td>Photosynthesis and Respiration</td>
<td>6</td>
</tr>
<tr>
<td>Genetics</td>
<td>3</td>
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<td>Populations</td>
<td>3</td>
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Total *32 *38

year-round traditional

* Suggested weeks are to be used as an estimate only. Pacing will depend on how State Content
Standards and Literacy and Mathematics Initiatives are embedded.

INVESTIGATION AND EXPERIMENTATION
In accordance with their individual capacity, students will grow in the ability to:
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