

**Alignments of**

**Project Learning Tree  
Secondary Environmental  
Education Program**

**The Changing Forest:  
Forest Ecology**

**to**

**California  
Science, Mathematics  
History-Social Studies  
English-Language Arts  
Standards**



## **Introduction**

The purpose of this document is to provide California secondary educators who use Project Learning Tree's *The Changing Forest: Forest Ecology* with an easy reference guide as to how PLT's activities align to the California Content Standards for grades 9-12. As part of the national movement to reform education, the California State Board of Education has adopted criteria to measure the skills, knowledge and ability that all students should be able to master in language arts, history/social science, science and mathematics.

Project Learning Tree is an interdisciplinary environmental education program. PLT activities supplement curriculum and can be used to organize instructional units in a variety of subjects. As this alignment will demonstrate, educators can use PLT activities to teach or assess mastery of content areas knowledge and skills. It is the goal of this document to help teachers provide students with lessons that reinforce critical and creative thinking while also covering the required standards.

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For more information about Project Learning Tree in California, contact Kay Antunez, PLT Coordinator, California Department of Forestry and Fire Protection, P. O. Box 944246, Sacramento, CA 94244-2460, or call (916) 653-7958.

A copy of the Content Standards for Grades K-12 can be obtained at:

<http://www.cde.ca.gov/be/st/ss>

Additional information about Project Learning Tree and copies of the correlations for other PLT materials can be obtained at: <http://www.plt.org/>

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# SCIENCE STANDARDS ALIGNMENTS

## GRADES 9-12

Standards without asterisks represent those that all students are expected to achieve in the course of their studies. Standards with asterisks represent those that all students should have the opportunity to learn.

## CHEMISTRY

### Conservation of Matter and Stoichiometry

3. **The conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants.** As a basis for understanding this concept, students know:
- how to describe chemical reactions by writing balanced equations.

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### Acids and Bases

5. **Acids, bases, and salts are three classes of compounds that form ions in water solutions.** As a basis for understanding this concept, students know:
- the observable properties of acids, bases and salt solutions.

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- how to use the pH scale to characterize acid and base solutions.

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### Solutions

6. **Solutions are homogenous mixtures of two or more substances.** As a basis for understanding this concept, students know:
- how to calculate the concentration of a solute in terms of grams per liter, molarity, parts per million and percent composition

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- f.\* how molecules in solution are separated or purified by the methods of chromatography and distillation.

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## BIOLOGY-LIFE SCIENCES

### **Cell Biology**

1. **Fundamental life processes of plants and animals depend on a variety of chemical reactions that are carried out in specialized areas of the organism's cells.** As a basis for understanding this concept, students know:
- f. usable energy is captured from sunlight by chloroplasts, and stored via the synthesis of sugar from carbon dioxide.

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### **Ecology**

6. **Stability in an ecosystem is a balance between competing effects.** As a basis for understanding this concept, students know:
- a. biodiversity is the sum total of different kinds of organisms, and is affected by alterations of habitats.

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- b. how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of non-native species, or changes in population size.

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- c. how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.

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- d. how water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles via photosynthesis and respiration.

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- e. a vital part of an ecosystem is the stability of its producers and decomposers.

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- g.\* how to distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of a lineage of organisms through genetic change.

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## **Evolution**

- 7. The frequency of an allele in a gene pool of a population depends on many factors, and may be stable or unstable over time.** As a basis for understanding this concept, students know:

- d. variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions.

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- 8. Evolution is the result of genetic changes that occur in constantly changing environments.** As a basis for understanding this concept, students know:

- a. how natural selection determines the differential survival of groups of organisms.

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- b. a great diversity of species increases the chance that at least some organisms survive large changes in the environment.

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## **EARTH SCIENCES**

### **Energy in the Earth System**

- 4. **Energy enters the Earth system primarily as solar radiation and eventually escapes as heat.** As a basis for understanding this concept, students know:
  - b. the fate of incoming solar radiation in terms of reflection, absorption, and photosynthesis.

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### **Biogeochemical Cycles**

- 7. **Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of biogeochemical cycles.** As a basis for understanding this concept, students know:
  - a. the carbon cycle of photosynthesis and respiration, and the nitrogen cycle.

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## **INVESTIGATION AND EXPERIMENTATION**

- 1. **Scientific progress is made by asking meaningful questions and conducting careful investigations.** As a basis for understanding this concept, and to address the content the other four strands, students should develop their own questions and perform investigations. Students will:

- a. select and use appropriate tools and technology (such as computer-linked probes, spread sheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.

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- d. formulate explanations using logic and evidence.

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- f. distinguish between hypothesis and theory as science terms.

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- g. recognize the use and limitations of models and theories as scientific representations of reality.

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- h. read and interpret topographic and geologic maps.

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- j. recognize the issues of statistical variability and the need for controlled tests.

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- l. analyze situations and solve problems that require combining and applying concepts from more than one area of science.

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- m. investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings. Examples include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources, and land and water use decisions in California.

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## **MATHEMATICS STANDARDS AND ALIGNMENTS**

### **GRADES EIGHT THROUGH TWELVE**

#### **Introduction**

The standards for grades eight through twelve are organized differently from those for kindergarten through grade seven. In this section strands are not used for organizational purposes as they are in the elementary grades because the mathematics studied in grades eight through twelve falls naturally under discipline headings: algebra, geometry, and so forth. Many schools teach this material in traditional courses; others teach it in an integrated fashion. To allow local educational agencies and teachers flexibility in teaching the material, the standards for grades eight through twelve do not mandate that a particular discipline be initiated and completed in a single grade. The core content of these subjects must be covered; students are expected to achieve the standards however these subjects are sequenced.

#### **Algebra I**

Symbolic reasoning and calculations with symbols are central in algebra. Through the study of algebra, a student develops an understanding of the symbolic language of mathematics and the sciences. In addition, algebraic skills and concepts are developed and used in a wide variety of problem-solving situations.

- 5.0** Students solve multi-step problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.

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## **Geometry**

The geometry skills and concepts developed in this discipline are useful to all students. Aside from learning these skills and concepts, students will develop their ability to construct formal, logical arguments and proofs in geometric settings and problems.

- 8.0** Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.

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- 19.0** Students use trigonometric functions to solve for an unknown length of a side of a right triangle, given an angle and a length of a side.

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# HISTORY AND SOCIAL STUDIES STANDARDS AND ALIGNMENTS

## GRADE 11

### UNITED STATES HISTORY AND GEOGRAPHY: CONTINUITY AND CHANGE IN THE TWENTIETH CENTURY

Students in grade eleven study the major turning points in American history in the 20th century. Following a review of the nation's beginnings and the impact of the Enlightenment on U.S. democratic ideals, students build upon the tenth grade study of global industrialization to understand the emergence and impact of new technology and a corporate economy, including the social and cultural effects. They trace the change in the ethnic composition of American society; the movement towards equal rights for racial minorities and women; and the role of the United States a major world power. An emphasis is placed on the expanding role of the federal government and federal courts as well as the continuing tension between the individual and the state. Students consider the major social problems of our time and trace their causes in historical events. They learn that the United States has served as a model for other nations and that the rights and freedoms we enjoy are not accidents, but the results of a defined set of political principles that are not always basic to citizens of other countries. Students understand that our rights under the U.S. Constitution comprise a precious inheritance that depends on an educated citizenry for their preservation and protection.

11.8 Students analyze the economic boom and social transformation of **post-World War II America**, in terms of:

6. the diverse environmental regions in North America, their relation to particular forms of economic life, and the origins and prospects of environmental problems in those regions

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11.11 Students analyze the **major social problems and domestic policy issues in contemporary American society**, in terms of:

5. the impact, need and controversies associated with environmental conservation, expansion of the national park system, and the development of environmental protection laws, with particular attention to the interaction between environmental protection and property rights

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## **GRADE 12**

### **PRINCIPLES OF AMERICAN DEMOCRACY**

Students in grade twelve pursue a deeper understanding of the institutions of American government. They compare systems of government in the world today and analyze the life and changing interpretations of the Constitution, the Bill of Rights, and the current state of the legislative, executive and judiciary branches of government. An emphasis is placed on analyzing the relationship among federal, state and local governments, with particular attention paid to important historical documents such as The Federalist. These standards represent the culmination of civic literacy as students prepare to vote, participate in community activities and assume the responsibilities of citizenship. In addition to studying government in grade twelve, students will also master fundamental economic concepts, applying the tools (graphs, statistics, equations) from other subject areas to the understanding of operations and institutions of economic systems. Studied in a historic context are the basic economic principles of micro and macroeconomics, international economics, comparative economics systems, measurement and methods.

12.2 Students evaluate, and take and defend positions on the **scope and limits of rights and obligations as democratic citizens**, the relationships among them, and how they are secured, in terms of:

4. the obligation of civic-mindedness including voting, being informed on civic issues, volunteering and performing public service, and serving in the military or alternative service

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- 12.3 Students evaluate, take and defend positions on what the **fundamental values and principles of civil society** are (i.e., the autonomous sphere of voluntary personal, social, and economic relations not part of government), their interdependence, and meaning and importance for a free society, in terms of:
2. how civil society makes it possible for people, individually or in association with others, to bring their influence to bear on government in ways other than voting and elections

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## ENGLISH AND LANGUAGE ARTS STANDARDS AND ALIGNMENTS

### GRADES NINE AND TEN

#### Reading

##### **2.0 Reading Comprehension (Focus on Informational Materials)**

Students read and understand grade-level-appropriate material. They analyze the organizational patterns, arguments, and positions advanced. The selections in *Recommended Literature, Grades Nine through Twelve* (1990) illustrate the quality and complexity of the materials to be read by students. In addition, by grade twelve, students read two million words annually on their own, including a wide variety of classic and contemporary literature, magazines, newspapers, and online information. In grades nine and ten, students make substantial progress toward this goal.

##### **Comprehension and Analysis of Grade-Level-Appropriate Text**

- 2.3 Generate relevant questions about readings on issues that can be researched.

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- 2.4 Synthesize the content from several sources or works by a single author dealing with a single issue; paraphrase the ideas and connect them to other sources and related topics to demonstrate comprehension.

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- 2.5 Extend ideas presented in primary or secondary sources through original analysis, evaluation, and elaboration.

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## **Writing**

### **1.0 Writing Strategies**

Students write coherent and focused essays that convey a well-defined perspective and tightly reasoned argument. The writing demonstrates students' awareness of the audience and purpose. Students progress through the stages of the writing process as needed.

### **Research and Technology**

- 1.3 Use clear research questions and suitable research methods (e.g., library, electronic media, personal interview) to elicit and present evidence from primary and secondary sources.

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### **2.0 Writing Applications (Genres and Their Characteristics)**

Students combine the rhetorical strategies of narration, exposition, persuasion, and description to produce texts of at least 1,500 words each. Student writing demonstrates a command of standard American English and the research, organizational, and drafting strategies outlined in Writing Standard 1.0.

Using the writing strategies of grades nine and ten outlined in Writing Standard 1.0, students:

- 2.3 Write expository compositions, including analytical essays and research reports:
- Marshal evidence in support of a thesis and related claims, including information on all relevant perspectives.
  - Convey information and ideas from primary and secondary sources accurately and coherently.
  - Make distinctions between the relative value and significance of specific data, facts, and ideas.

- d. Include visual aids by employing appropriate technology to organize and record information on charts, maps, and graphs.
- e. Anticipate and address readers' potential misunderstandings, biases, and expectations.
- f. Use technical terms and notations accurately.

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- 2.6 Write technical documents (e.g., a manual on rules of behavior for conflict resolution, procedures for conducting a meeting, minutes of a meeting):
  - a. Report information and convey ideas logically and correctly.
  - b. Offer detailed and accurate specifications.
  - c. Include scenarios, definitions, and examples to aid comprehension (e.g., troubleshooting guide).
  - d. Anticipate readers' problems, mistakes, and misunderstandings.

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## **Listening and Speaking**

### **1.0 Listening and Speaking Strategies**

Students formulate adroit judgments about oral communication. They deliver focused and coherent presentations of their own that convey clear and distinct perspectives and solid reasoning. They use gestures, tone, and vocabulary tailored to the audience and purpose.

#### **Comprehension**

- 1.1 Formulate judgments about the ideas under discussion and support those judgments with convincing evidence.

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#### **Organization and Delivery of Oral Communication**

- 1.3 Choose logical patterns of organization (e.g., chronological, topical, cause and effect) to inform and to persuade, by soliciting agreement or action, or to unite audiences behind a common belief or cause.

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- 1.8 Produce concise notes for extemporaneous delivery.

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## **2.0 Speaking Applications (Genres and Their Characteristics)**

Students deliver polished formal and extemporaneous presentations that combine the traditional rhetorical strategies of narration, exposition, persuasion, and description. Student speaking demonstrates a command of standard American English and the organizational and delivery strategies outlined in Listening and Speaking Standard 1.0.

Using the speaking strategies of grades nine and ten outlined in Listening and Speaking Standard 1.0, students:

- 2.2 Deliver expository presentations:
- Marshal evidence in support of a thesis and related claims, including information on all relevant perspectives.
  - Convey information and ideas from primary and secondary sources accurately and coherently.
  - Make distinctions between the relative value and significance of specific data, facts, and ideas.
  - Include visual aids by employing appropriate technology to organize and display information on charts, maps, and graphs.
  - Anticipate and address the listener's potential misunderstandings, biases, and expectations.
  - Use technical terms and notations accurately.

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- 2.5 Deliver persuasive arguments (including evaluation and analysis of problems and solutions and causes and effects):
- Structure ideas and arguments in a coherent, logical fashion.
  - Use rhetorical devices to support assertions (e.g., by appeal to logic through reasoning; by appeal to emotion or ethical belief; by use of personal anecdote, case study, or analogy).
  - Clarify and defend positions with precise and relevant evidence, including facts, expert opinions, quotations, expressions of commonly accepted beliefs, and logical reasoning.
  - Anticipate and address the listener's concerns and counterarguments.

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## **GRADES ELEVEN AND TWELVE**

### **Reading**

#### **2.0 Reading Comprehension (Focus on Informational Materials)**

Students read and understand grade-level-appropriate material. They analyze the organizational patterns, arguments, and positions advanced. The selections in Recommended Readings in Literature, Grades Nine through Twelve illustrate the quality and complexity of the materials to be read by students. In addition, by grade twelve, students read two million words annually on their own, including a wide variety of classic and contemporary literature, magazines, newspapers, and online information.

#### **Comprehension and Analysis of Grade-Level-Appropriate Text**

2.3 Verify and clarify facts presented in other types of expository texts by using a variety of consumer, workplace, and public documents.

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### **Writing**

#### **1.0 Writing Strategies**

Students write coherent and focused texts that convey a well-defined perspective and tightly reasoned argument. The writing demonstrates students' awareness of the audience and purpose and progression through the stages of the writing process.

#### **Organization and Focus**

1.3 Structure ideas and arguments in a sustained, persuasive, and sophisticated way and support them with precise and relevant examples.

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### **Listening and Speaking**

#### **1.0 Listening and Speaking Strategies**

Students formulate adroit judgments about oral communication. They deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning. They use gestures, tone, and vocabulary tailored to the audience and purpose.

### **Organization and Delivery of Oral Communication**

- 1.6 Use logical, ethical, and emotional appeals that enhance a specific tone and purpose.

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### **Analysis and Evaluation of Oral and Media Communications**

- 1.13 Analyze the four basic types of persuasive speech (i.e., propositions of fact, value, problem, or policy) and understand the similarities and differences in their patterns of organization and the use of persuasive language, reasoning, and proof.

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