



California Subject Examinations for Teachers®

TEST GUIDE

AGRICULTURE SUBTEST I

Subtest Description

This document contains the Agriculture subject matter requirements arranged according to the domains covered by Subtest I of CSET: Agriculture. In parentheses after each named domain is the domain code from the Agriculture subject matter requirements.

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CS-TG-SD172X-01

Agriculture
Subtest I: Plant and Soil Science; Ornamental Horticulture

**Part I: Content Domains for Subject Matter Understanding and Skill in
Agriculture**

PLANT AND SOIL SCIENCE (SMR Domain 1)

Candidates demonstrate a broad understanding of principles of plant and soil science. Candidates apply this knowledge to plan and implement programs. Candidates are able to demonstrate an understanding of a range of topics in plant and soil science, including soil science; plant nutrition and soil treatments; plant classification, anatomy, and physiology; plant genetics, reproduction, and propagation; crop production practices; and emerging technologies in plant and soil science.

0001 Characteristics, Components, and Properties of Soil (SMR 1.1)

- a. Demonstrate knowledge of soil biology (e.g., soil food chains) and soil components (e.g., humus, sand, clay, silt) and their relevance for supporting plant growth.
- b. Demonstrate knowledge of properties of soil (e.g., texture, particle size, structure, pore space) and characteristics of different types of soil.
- c. Analyze the relationship of soil type and composition to crop selection and production.

0002 Plant Nutrition and Soil Treatments (SMR 1.2)

- a. Demonstrate an understanding of plant nutrition and the role of various nutrients (e.g., nitrogen, phosphorus, potassium) in plant growth.
- b. Demonstrate knowledge of how to conduct and interpret basic soil tests (e.g., fertility, texture, pH).
- c. Demonstrate knowledge of different types (e.g., organic, inorganic, slow release), forms (e.g., liquid, granule), uses, and formulations of fertilizer and other soil amendments.

0003 Plant Classification, Anatomy, and Physiology (SMR 1.3)

- a. Demonstrate an understanding of principles of plant classification and identification (e.g., using dichotomous keys) and characteristics of major plant groups (e.g., monocots, dicots).
- b. Demonstrate knowledge of types (e.g., forage, grain, tree, vine, vegetable), varieties, characteristics, and uses of agriculturally important crops grown in California.
- c. Demonstrate knowledge of the nature and functions of plant cells, structures, organs, and systems.

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- d. Demonstrate an understanding of physiological processes in plants (e.g., photosynthesis, respiration, transpiration, transport of nutrients and water).
- e. Demonstrate knowledge of processes of plant growth and analyze factors that influence plant growth (e.g., water, light, temperature, pruning).

0004 Plant Genetics, Reproduction, and Propagation (SMR 1.4)

- a. Demonstrate an understanding of processes and structures involved in asexual and sexual reproduction in plants.
- b. Demonstrate knowledge of plant genetics, selective breeding, and hybridization.
- c. Demonstrate knowledge of methods and techniques of plant propagation (e.g., seeds, budding, grafting, division).

0005 Crop Management and Production (SMR 1.5)

- a. Demonstrate knowledge of characteristics and uses of tillage, seedbed preparation, planting layout (e.g., raised bed, strip cropping), and planting methods.
- b. Demonstrate knowledge of crop management methods and practices (e.g., drainage, irrigation, mulching, crop rotation, land classification) in the production of various crops.
- c. Demonstrate knowledge of characteristics of plant pests, diseases, and weeds and methods for their control (e.g., chemical pest control, biological pest control, integrated pest management, cultivation).
- d. Demonstrate knowledge of procedures for the safe handling, application, and disposal of agricultural chemicals.
- e. Demonstrate knowledge of methods of harvesting common California crops and principles and procedures for post-harvest handling, processing, and storing of these crops.
- f. Demonstrate an understanding of food safety issues and societal concerns regarding crop production (e.g., pesticide residues, contamination during picking and handling, irradiated food, transgenic crops) and alternative methods of crop production (e.g., organic farming).

0006 Emerging Technologies in Plant Production (SMR 1.6)

- a. Demonstrate an understanding of new technologies in plant propagation (e.g., micro-propagation).
- b. Demonstrate an understanding of new technologies for crop improvement (e.g., biotechnology, genetic engineering).
- c. Demonstrate knowledge of new technologies used for crop management and production (e.g., remote sensing, precision farming, Variable Rate Technology [VRT], Geographic Information Systems [GIS], Global Positioning Systems [GPS]).

(Draft Curriculum Standards for Agriculture [2004]: Standards 1.10–1.12, 3. California Agricultural Education Career Preparation Standards: Grades 11–12 [1995]: Plant and Soil Science Career Path Standards 1–7. Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness [1999]: Standard 3.)

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ORNAMENTAL HORTICULTURE (SMR Domain 2)

Candidates demonstrate a broad understanding of principles of ornamental horticulture. Candidates apply this knowledge to plan and implement programs. Candidates are able to demonstrate an understanding of a range of topics in ornamental horticulture, including greenhouse and nursery management, landscape design and management, and floriculture and floral design.

0007 Greenhouse and Nursery Management (SMR 2.1)

- a. Demonstrate knowledge of types, varieties, characteristics, and uses of greenhouse and nursery crops (e.g., shrubs, flowers, bedding plants, potted plants) grown in California.
- b. Demonstrate an understanding of the types, characteristics, uses, and care of greenhouse and nursery facilities, tools, and equipment, as well as methods for managing the greenhouse and nursery environments (e.g., water management; scheduling production; controlling temperature, light, and humidity).
- c. Demonstrate knowledge of types, characteristics, uses, and preparation of growing media in greenhouses and nurseries.
- d. Demonstrate knowledge of characteristics of pests, diseases, and weeds in greenhouses and nurseries, as well as methods for their identification and control (e.g., integrated pest management).
- e. Demonstrate knowledge of production of greenhouse and nursery crops (e.g., propagating, transplanting, hardening off, pruning, forcing, controlling day length, fertilizing, watering).

0008 Landscape Design, Construction, and Management (SMR 2.2)

- a. Demonstrate knowledge of types, varieties, characteristics, and uses of plants (e.g., turfgrasses, annuals, perennials, shrubs, trees) and materials used in landscaping in California.
- b. Demonstrate knowledge of principles of landscape design, planning, and construction.
- c. Demonstrate knowledge of methods for selecting, planting, irrigating, caring for, pruning, and maintaining landscape plants and turfgrass.
- d. Demonstrate knowledge of types, characteristics, uses, and care of tools and equipment used in landscaping and turfgrass maintenance and installation.

0009 Floral Design (SMR 2.3)

- a. Demonstrate knowledge of varieties, characteristics, and uses (e.g., line, mass, filler, form) of flowers and foliage in floral design.
- b. Demonstrate knowledge of procedures for harvesting, handling, storing, and preparing cut flowers.
- c. Demonstrate an understanding of the basic elements (e.g., form, line, texture, space, color) and principles (e.g., balance, scale, proportion, rhythm, focal point, contrast, harmony) of floral design.

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- d. Demonstrate knowledge of types, characteristics, uses, and care of facilities, tools, equipment, and materials used in floral design.

(Draft Curriculum Standards for Agriculture [2004]: Standard 5. California Agricultural Education Career Preparation Standards: Grades 11–12 [1995]: Ornamental Horticulture Career Path Standards 1–6. Agriculture Teacher Preparation in California: Standards of Quality and Effectiveness [1999]: Standard 4.)

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**Part II: Subject Matter Skills and Abilities Applicable to the
Content Domains in Agriculture**

Candidates apply knowledge of scientific principles and methods, experimental design, measurement, and data analysis to investigate and understand agriculture-related problems and issues. Candidates understand and apply safety rules and practices in the classroom, laboratory, field, and Supervised Agricultural Experience (SAE) settings.

Candidates understand the integral relationships among classroom activities, FFA programs, and SAEs in the context of the local community. Candidates apply organizational, leadership, and communication skills to work effectively with groups and individuals (e.g., advisory committees, industry representatives, community organizations, student organizations, school leaders, elected officials). They understand the goals and purposes of SAE programs and the characteristics of different types of SAEs. They understand strategies for coordinating student SAEs and for supervising, advising, and supporting students during their experiences. Candidates understand the characteristics, functions, and organizational structures of student leadership development organizations (e.g., FFA) and their roles and responsibilities as advisors to these organizations. Candidates are able to effectively represent the agricultural program in individual and group settings in the school, community, and industry. Candidates are able to understand and respond to issues related to diversity, equity, and ethics in the agriculture program.

Candidates understand historical events, current research, and recent developments in agriculture. They are familiar with social, economic, legal, and ethical issues in the field. They apply strategies (e.g., accessing Internet resources, joining professional organizations) for staying abreast of current issues and developments in agriculture. They are able to identify industry trends and job opportunities, employers' expectations, and the personal characteristics (e.g., appropriate work habits, social and communication skills) necessary for a successful career in agriculture. They apply their knowledge to assist students in academic and career planning and development and in applying for, obtaining, and maintaining employment in agriculture and related fields.

Candidates understand the interrelationships and connections among the various subdisciplines of agriculture and between agriculture and other disciplines commonly taught in public schools. Candidates can identify and integrate themes and concepts among these disciplines and subdisciplines.