



**California  
Subject  
Examinations for  
Teachers®**

**TEST GUIDE**

**AGRICULTURE  
SUBTEST II**

**Sample Questions and Responses  
and Scoring Information**

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CS-TG-QR173X-01

## Sample Test Questions for CSET: Agriculture Subtest II

Below is a set of multiple-choice questions and constructed-response questions that are similar to the questions you will see on Subtest II of CSET: Agriculture. You are encouraged to respond to the questions without looking at the responses provided in the next section. Record your responses on a sheet of paper and compare them with the provided responses.

1. Which of the following best describes how long bones such as the femur and tibia grow after birth in mammals?
  - A. New bone is formed at zones of rapid cell division located between the shaft and the epiphyses at each end of the bone.
  - B. New bone grows outward in both directions from a single zone of rapid cell division located at the midpoint of the shaft of the bone.
  - C. New bone is formed at all points throughout the bone as existing bone cells divide and form new bone cells.
  - D. New bone is formed at joint surfaces as rapidly dividing cartilage cells are mineralized and transformed into bone.
2. Which of the following best explains why swine feeds are often supplemented by the addition of B vitamins, but dairy cattle feeds are usually not?
  - A. Bacteria in the rumen of dairy cattle produce sufficient B vitamins to meet the animals' needs.
  - B. Water-soluble B vitamins are excreted in milk, making it unfit for human consumption.
  - C. Roughage in the feed of dairy cattle contains sufficient B vitamins to meet the animals' needs.
  - D. The minimum daily requirements for B vitamins are lower in dairy cattle than in swine.
3. Which of the following best describes the Hereford breed of cattle?
  - A. large, black and white, used primarily for meat
  - B. large, uniform black color, used primarily for milk
  - C. medium size, reddish with a white face, used primarily for meat
  - D. small, uniform light brown color, used primarily for milk

4. Which of the following is one method for preventing internal parasites of sheep, such as lungworm or common stomach worm?
- A. regularly rotating animals to different pastures
  - B. isolating from the rest of the flock animals with symptoms of the disease
  - C. dipping the animals in a pesticide solution
  - D. periodically administering a small dose of antibiotic in the animals' feed
5. Grass tetany, also known as grass staggers, is most likely to occur when lactating cows are turned out in pastures grown on soils that are deficient in which of the following nutrients?
- A. iron
  - B. magnesium
  - C. nitrogen
  - D. potassium
6. Grit is included in the diet of poultry in order to:
- A. fill birds' stomachs and help prevent overeating.
  - B. provide bulk and help birds excrete feces.
  - C. help birds grind food into smaller particles.
  - D. provide necessary minerals in the diet.
7. The expression of harmful recessive genes in the phenotype of the offspring is most likely to occur when using which of the following breeding systems?
- A. linebreeding
  - B. inbreeding
  - C. outcrossing
  - D. crossbreeding
8. When selectively breeding livestock, improvement will be most rapid when the trait being selected is:
- A. genetically recessive.
  - B. determined by many genes.
  - C. highly heritable.
  - D. strongly influenced by environment.

9. Confinement housing for livestock often includes manure pits for storage of manure. Which of the following is the most important hazard associated with locating these pits within the facility where the animals are raised?
- A. Parasite eggs in the manure may become airborne and be inhaled by humans and animals.
  - B. Aerobic decomposition of manure may raise temperatures high enough to become a fire hazard.
  - C. Evaporation may raise humidity levels and cause respiratory problems in humans and animals.
  - D. Anaerobic decomposition of manure may release gases that are highly toxic to humans and animals.
10. Which of the following is an example of the use of a renewable resource?
- A. burning natural gas to dry grain in a grain dryer
  - B. using boards made from recycled plastic to build a playground
  - C. burning wood from prunings to heat a farm shop
  - D. replacing standard light bulbs with low-energy light bulbs in a barn
11. In the 1930s, before the extensive use of pesticides, about 30% of a crop was lost to insect pests. When pesticides were first introduced, crop losses fell to negligible levels, but today, with 1–2 billion pounds of pesticides used annually, crop losses to insect pests average around 35%. Which of the following best explains one reason that crop losses have risen to 1930s levels despite the extensive use of pesticides?
- A. Hybrid crops that have been introduced since the 1930s have proven to be less resistant to pests than older varieties.
  - B. Increased acreage under cultivation since the 1930s has exposed more crops to pest reservoirs living in uncultivated land.
  - C. Heavy pesticide use has led to the reduction in populations of beneficial insects that prey upon and parasitize insect pests.
  - D. Heavy use of chemical fertilizers since the 1930s has resulted in larger, more vigorous plants that are more attractive to pests.

12. Which of the following is the most practical and effective way to prevent fertilizer runoff and potential contamination of groundwater from agricultural fields during fallow periods?
- A. digging a ditch several feet deep all around the borders of the field
  - B. cultivating with a disk harrow several times during the fallow period
  - C. plowing under all crop residues immediately after the harvest
  - D. planting a cover crop in the field that will be plowed under at the end of the fallow period
13. Which of the following is one potential disadvantage of using secondary treated urban wastewater to irrigate crops?
- A. Supplies of urban wastewater are too variable to make wastewater a dependable source for irrigation.
  - B. Urban wastewater often contains high levels of salts, which can lead to increased salinization of soils.
  - C. Treatment of urban wastewater to kill pathogenic bacteria can make the water toxic to plant roots.
  - D. Urban wastewater often contains phosphorus, which can lead to too-rapid growth of crops.
14. The most severe effects of the pathogen *Phytophthora*, which quickly kills mature trees, are seen in several species of:
- A. maple.
  - B. pine.
  - C. spruce.
  - D. oak.
15. In an uncontrolled fire, a firestorm is most likely to occur when:
- A. a fire burning in coniferous forest spreads into deciduous hardwoods.
  - B. two fires moving in opposite directions merge into a single fire.
  - C. a fire burns in grassland or chaparral that lacks trees to block the wind.
  - D. updrafts created by the heat of a fire suck oxygen into the fire's base.

**16. Complete the exercise that follows.**

Using your knowledge of animal science, select one of the following four animals: (1) dairy cattle, (2) swine, (3) horses, and (4) poultry (egg production) and write a response in which you:

- describe three features that characterize an ideal animal of that species; and
- identify one breed of the animal selected and describe three characteristics (e.g., appearance, size) of that breed.

**17. Use the information below to complete the exercise that follows.**

Imagine that you are a commercial cattle producer who is interested in producing cattle that will earn you the premium paid for beef that qualifies for the "Certified Angus Beef" program. To qualify for this premium, cattle must be black in color. You also want to produce polled cattle so that no calves will have to go through the stress of dehorning. The black color trait is dominant over the red trait in Angus cattle. The polled trait is also dominant.

You are currently using a bull that is heterozygous black and heterozygous polled (BbPp). You intend to mate the bull to a cow that is also heterozygous black and heterozygous polled (BbPp).

Using your knowledge of genetics, write a response in which you:

- create a Punnett square diagramming all possible genotypes that the mating could produce;
- describe the probability that the mating will produce each possible genotype listed in the Punnett square; and
- describe the probability that the mating will produce each possible phenotype (i.e., black polled, black horned, red polled, and red horned).

18. **Use the information below to complete the exercise that follows.**

Imagine that you are a manager of a poultry farm.

Using your knowledge of environmental science, write a response in which you:

- describe one way that your operation might negatively affect groundwater in your locality; and
- describe at least one way to mitigate this negative effect.



# Annotated Responses to Sample Multiple-Choice Questions for CSET: Agriculture Subtest II

## Animal Science

1. **Correct Response: A.** (SMR Code: 3.1) In mammals, long bones in immature animals consist of a bony shaft and two or more epiphyses located at the ends of the bones. Between the shaft and each epiphysis is a growth plate in which new cells are formed, mineralized, and deposited at the end of the shaft.
2. **Correct Response: A.** (SMR Code: 3.1) Dairy cattle are ruminants and possess multiple stomach compartments to help digest feed that is high in roughage. Ruminant stomachs contain large populations of bacteria that break down cellulose and other hard-to-digest plant compounds. As a by-product of bacterial action, B vitamins are produced in sufficient quantities to meet the animal's need. Swine are nonruminants and possess comparatively simple, single-chambered stomachs. Because swine lack the large, specialized bacterial populations that produce B vitamins in ruminants, swine feeds must be supplemented with this nutrient.
3. **Correct Response: C.** (SMR Code: 3.2) Hereford cattle are one of the most important breeds of beef cattle raised in the United States. Herefords are medium-sized cattle, are red and white in coloration, and commonly have a white face.
4. **Correct Response: A.** (SMR Code: 3.2) The cycle of transmission of most internal parasites of sheep begins when eggs of the parasite are shed in the droppings of an infected animal. When other animals eat the eggs while grazing, they also become infected. This cycle can be broken by rotating sheep regularly to clean pastures and allowing sufficient time for natural mortality to reduce the number of infective eggs on grazed pastures before regrazing.
5. **Correct Response: B.** (SMR Code: 3.3) Magnesium is an important electrolyte that is also necessary for the proper stimulation of muscles and nerves. Lactating cows that are put into pasture that is naturally low in magnesium may suffer deficiency of this mineral. Low magnesium causes grass tetany, or grass staggers, which can lead to muscle trembling, convulsions, and rapid death.
6. **Correct Response: C.** (SMR Code: 3.3) Most mammals and reptiles have teeth in their jaws, which they use to break up food into smaller particles before swallowing. Birds do not have teeth and cannot chew their food. Part of the stomach of birds, called the gizzard, has thick muscular walls to help grind up food. Many species of birds, especially those that eat seeds or other plant matter, swallow small stones that remain in the gizzard. These act as grindstones to mechanically break down food before it reaches the intestine.
7. **Correct Response: B.** (SMR Code: 3.4) Inbreeding is the mating of closely related animals. Successive generations of inbreeding tends to reduce heterozygosity and increase both dominant and recessive homozygosity in the inbred gene pool. Since most harmful recessives are only expressed in the phenotype in homozygous genotypes, inbreeding will increase the expression of these harmful recessive traits.
8. **Correct Response: C.** (SMR Code: 3.4) Selective breeding of livestock is designed to change the genotype of one or more traits in subsequent generations. Changes in the genotype will be reflected in the phenotype only if a particular phenotypic trait is determined primarily by the genotype. Such traits are said to be highly heritable.

9. **Correct Response: D.** (SMR Code: 3.5) Manure pits that are located beneath animal pens within confinement houses often contain insufficient oxygen to facilitate breakdown of the manure by aerobic bacteria. Digestion of manure by anaerobic bacteria produces toxic gases that must be removed by active ventilation systems.

### Environmental Science and Natural Resource Management

10. **Correct Response: C.** (SMR Code: 4.1) Using wood from prunings for fuel is an example of using a renewable resource, since additional wood will be produced without depleting any natural resources.
11. **Correct Response: C.** (SMR Code: 4.2) Introduction of pesticides resulted in a very dramatic decrease in crop losses due to insect infestation. These pesticides, however, kill both beneficial and pest insects. Pest insects often have a rapid life cycle and rebound quickly from population crashes, while beneficial predator and parasite insects often do not rebound as quickly. The resulting destruction of populations of beneficial insects has removed a natural check on the populations of pests. This has led to continuing problems with pests that were important before pesticides were introduced, as well as the emergence of new pest species that were previously held in check by natural controls.
12. **Correct Response: D.** (SMR Code: 4.2) A cover crop that is planted on a fallow field will prevent fertilizer runoff by binding soil surface particles to hold water and increase infiltration, absorbing water for growth of the crop, and soaking up excess nutrients. Plowing the crop under at the end of the fallow period will increase organic matter in the soil, which will increase the soil's water-holding capacity and release nutrients slowly as the organic matter decays.
13. **Correct Response: B.** (SMR Code: 4.3) Treated urban wastewater contains a variety of mineral salts that are released from homes or factories (e.g., nitrogen from sewage, phosphorus from detergents). Many of these salts are plant nutrients and may act in the same way as chemical fertilizers to stimulate plant growth. Continued use of nutrient-laden irrigation water, whether the nutrients are from chemical fertilizers or from urban sources, can lead to salinization of soils under certain conditions.
14. **Correct Response: D.** (SMR Code: 4.4) California has recently experienced a major outbreak of sudden oak death from the spread of an introduced fungus-like pathogen in the genus *Phytophthora*. Although *Phytophthora* can infest many species of shrubs and trees, oaks are most susceptible to infection and death.
15. **Correct Response: D.** (SMR Code: 4.4) The two requirements for the development of a firestorm are sufficient fuel and a plentiful supply of oxygen. Firestorms generally develop when heat rising from a crown fire in woodland creates strong updrafts. These suck oxygen into the base of the fire, which increases the rate of burning of the available fuel, creating more updrafts and further increasing the size of the fire.

## Examples of Responses to Sample Constructed-Response Questions for CSET: Agriculture Subtest II

### Animal Science

#### Question #16 (Strong Response)

The ideal dairy cow is feed efficient; that is, the ratio of pounds of milk produced per pound of feed is at least 1.6. It is structurally sound with a large, symmetrical udder and has a calm and gentle disposition.

The Holstein cow is black and white in color, has a large frame, and is a highly prolific milk producer.

#### Question #16 (Weak Response)

The ideal dairy cow is large and muscular. It is alert and free of diseases. It produces milk with a high butterfat content.

The Holstein is usually brown or white in color. It has a hearty appetite and will eat almost anything. It produces up to ten quarts of milk a day.

Question #17 (Strong Response)

Set up the Punnett square

	BP	Bp	bP	bp
BP				
Bp				
bP				
bp				

Fill in the Punnett square

	BP	Bp	bP	bp
BP	BBPP	BBPp	BbPP	BbPp
Bp	BBPp	BBpp	BbPp	Bbpp
bP	BbPP	BbPp	bbPP	bbPp
bp	BbPp	Bbpp	bbPp	bbpp

Probability of each genotype:

- BBPP 1/16 homozygous black / homozygous polled
- BBPp 2/16 homozygous black / heterozygous polled
- BBpp 1/16 homozygous black / homozygous horned
- BbPP 2/16 heterozygous black / homozygous polled
- BbPp 4/16 heterozygous black / heterozygous polled
- Bbpp 2/16 heterozygous black / homozygous horned
- bbPP 1/16 homozygous red / homozygous polled
- bbPp 2/16 homozygous red / heterozygous polled
- bbpp 1/16 homozygous red / homozygous horned

Probability of each phenotype:

- 9/16 black / polled
- 3/16 black / horned
- 3/16 red / polled
- 1/16 red / horned

## Question #17 (Weak Response)

Set up the Punnett square

	Black	Red	Horned	Polled
Black				
Red				
Horned				
Polled				

Fill in the Punnett square

	Black	Red	Horned	Polled
Black			Black/Horned	Black/Polled
Red			Red/Horned	Red/Polled
Horned	Black/Horned	Red/Horned		
Polled	Black/Polled	Red/Polled		

Probability of each genotype:

Since black color and polled trait are dominant, the probability of black offspring is greater than of red. Similarly the probability of polled offspring is greater than of horned.

Probability of each phenotype:

The probability is of black polled is the greatest. Next most likely are either black horned or red polled. Least likely are red polled.

## Environmental Science and Natural Resource Management

### Question #18 (Strong Response)

A poultry farm can introduce a number of different types of contaminants into groundwater. For example, manure from the animals is often collected in ponds, pits, or piles for storage or for future use as fertilizer. Contaminants such as nitrogen, phosphorus, and bacteria may leach out of these holding sites into groundwater.

This contamination can be mitigated if the manure is decomposed either by aerobic or anaerobic means. Also, holding sites can be located away from wells and lined with clay or some other nonpermeable material.

### Question #18 (Weak Response)

Poultry farming produces many organic and chemical contaminants, which can be hazardous and cause illness if introduced into the water supply. This is something the consumer may not be aware of when she sees a carton of fresh, clean eggs in the supermarket. Yet poultry farmers must be vigilant to be sure the water they drink is not tainted with microbes.

This hazard can be reduced by keeping the poultry clean and by removing manure frequently.

## Scoring Information for CSET: Agriculture Subtest II

Responses to the multiple-choice questions are scored electronically. Scores are based on the number of questions answered correctly. There is no penalty for guessing.

There are three constructed-response questions in Subtest II of CSET: Agriculture. Each of these constructed-response questions is designed so that a response can be completed within a short amount of time—approximately 10–15 minutes. Responses to the constructed-response questions are scored by qualified California educators using focused holistic scoring. Scorers will judge the overall effectiveness of your responses while focusing on the performance characteristics that have been identified as important for this subtest (see below). Each response will be assigned a score based on an approved scoring scale (see page 16).

Your performance on the subtest will be evaluated against a standard determined by the California Commission on Teacher Credentialing based on professional judgments and recommendations of California educators.

### Performance Characteristics for CSET: Agriculture Subtest II

The following performance characteristics will guide the scoring of responses to the constructed-response questions on CSET: Agriculture Subtest II.

<b>PURPOSE</b>	The extent to which the response addresses the constructed-response assignment's charge in relation to relevant CSET subject matter requirements.
<b>SUBJECT MATTER KNOWLEDGE</b>	The application of accurate subject matter knowledge as described in the relevant CSET subject matter requirements.
<b>SUPPORT</b>	The appropriateness and quality of the supporting evidence in relation to relevant CSET subject matter requirements.

## Scoring Scale for CSET: Agriculture Subtest II

Scores will be assigned to each response to the constructed-response questions on CSET: Agriculture Subtest II according to the following scoring scale.

SCORE POINT	SCORE POINT DESCRIPTION
3	<p><b>The "3" response reflects a command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Agriculture.</b></p> <ul style="list-style-type: none"> <li>• The purpose of the assignment is fully achieved.</li> <li>• There is an accurate application of relevant subject matter knowledge.</li> <li>• There is appropriate and specific relevant supporting evidence.</li> </ul>
2	<p><b>The "2" response reflects a general command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Agriculture.</b></p> <ul style="list-style-type: none"> <li>• The purpose of the assignment is largely achieved.</li> <li>• There is a largely accurate application of relevant subject matter knowledge.</li> <li>• There is acceptable relevant supporting evidence.</li> </ul>
1	<p><b>The "1" response reflects a limited or no command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Agriculture.</b></p> <ul style="list-style-type: none"> <li>• The purpose of the assignment is only partially or not achieved.</li> <li>• There is limited or no application of relevant subject matter knowledge.</li> <li>• There is little or no relevant supporting evidence.</li> </ul>
U	<p><b>The "U" (Unscorable) is assigned to a response that is unrelated to the assignment, illegible, primarily in a language other than English, or does not contain a sufficient amount of original work to score.</b></p>
B	<p><b>The "B" (Blank) is assigned to a response that is blank.</b></p>