

Introduction - Life Science

The following released test questions are taken from the Life Science Standards Test. This test is one of the California Standards Tests administered as part of the Standardized Testing and Reporting (STAR) Program under policies set by the State Board of Education.

All questions on the California Standards Tests are evaluated by committees of content experts, including teachers and administrators, to ensure their appropriateness for measuring the California academic content standards in Life Science. In addition to content, all items are reviewed and approved to ensure their adherence to the principles of fairness and to ensure no bias exists with respect to characteristics such as gender, ethnicity, and language.

This document contains released test questions from the California Standards Test form in 2006 and 2007. First on the pages that follow are lists of the Grades 6 through 12 standards assessed on the Life Science Test. Next are released test questions. Following the questions is a table that gives the correct answer for each question, the content standard that each question is measuring, and the year each question appeared on the test.

The following table lists each reporting cluster, the number of items that appear on the exam, and the number of released test questions that appear in this document.

REPORTING CLUSTER	NUMBER OF QUESTIONS ON EXAM	NUMBER OF RELEASED TEST QUESTIONS
Investigation and Experimentation <i>Grade 6</i> (Standards 6LSIE7. c, e) <i>Grade 7</i> (Standards 7LSIE7. c) <i>Grade 8</i> (Standards 8LSIE9. b-c) <i>Grades 9-12</i> (Standards BIIE1. c, f, i-j)	6	3
Cell Biology <i>Grade 7</i> (Standards 7LS1. c-e) <i>Grade 8</i> (Standards 8PC6. b-c) <i>Biology/Life Sciences</i> (Standards BI1. a, c, f)	10	5
Genetics <i>Grade 7</i> (Standards 7LS2. a, c-e) <i>Biology/Life Sciences</i> (Standards BI2. b, d-f; BI3. a; BI5. a)	12	6
Ecology <i>Grade 6</i> (Standards 6LS5. b-c, e) <i>Biology/Life Sciences</i> (Standards BI6. a-f)	11	6
Evolution <i>Grade 7</i> (Standards 7LS3. a-c) <i>Biology/Life Sciences</i> (BI7. a-d, BI8. a-b, e)	11	5
Physiology <i>Grade 7</i> (Standards 7LS5. a, c; 7LS6. j) <i>Biology/Life Sciences</i> (Standards BI9. a-b, BI10. b-d)	10	5
TOTAL	60	30

In selecting test questions for release, three criteria are used: (1) the questions adequately cover a selection of the academic content standards assessed on the Life Science Test; (2) the questions demonstrate a range of difficulty; and (3) the questions represent a variety of ways standards can be assessed. These released test questions do not reflect all of the ways the standards may be assessed. Released test questions will not appear on future tests.

For more information about the California Standards Tests, visit the California Department of Education's Web site at <http://www.cde.ca.gov/ta/tg/sr/resources.asp>.

THE INVESTIGATION AND EXPERIMENTATION REPORTING CLUSTER

The following nine California content standards are included in the Investigation and Experimentation reporting cluster and are represented in this booklet by three test questions. These questions represent only some ways in which these standards may be assessed on the California Life Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Investigation and Experimentation

Grade 6 Standards

- 6LSIE7.** 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:
- 6LSIE7.c.** Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
- 6LSIE7.e.** Recognize whether evidence is consistent with a proposed explanation.

Grade 7 Standards

- 7LSIE7.** 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:
- 7LSIE7.c.** Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.

Grade 8 Standards

- 8LSIE9.** 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:
- 8LSIE9.b.** Evaluate the accuracy and reproducibility of data.
- 8LSIE9.c.** Distinguish between variable and controlled parameters in a test.

Grades 9-12 Standards

- BIIE1.** 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 four strands, students should develop their own questions and perform investigations. Students will:
- BIIE1.c.** Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- BIIE1.f.** Distinguish between hypothesis and theory as scientific terms.
- BIIE1.i.** Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena (e.g., relative ages of rocks, locations of planets over time, and succession of species in an ecosystem).
- BIIE1.j.** Recognize the issues of statistical variability and the need for controlled tests.

THE CELL BIOLOGY REPORTING CLUSTER

The following eight California content standards are included in the Cell Biology reporting cluster and are represented in this booklet by five test questions. These questions represent only some ways in which these standards may be assessed on the California Life Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Cell Biology

Grade 7 Standards

7LS1. 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:

7LS1.c. *Students know* the nucleus is the repository for genetic information in plant and animal cells.

7LS1.d. *Students know* that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.

7LS1.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.

Grade 8 Standards

8PC6. Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept:

8PC6.b. *Students know* that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.

8PC6.c. *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.

Biology/Life Science Standards

BI1. The fundamental life processes of plants and animals depend on a variety of chemical reactions that occur in specialized areas of the organism's cells. As a basis for understanding this concept:

BI1.a. *Students know* cells are enclosed within semipermeable membranes that regulate their interaction with their surroundings.

BI1.c. *Students know* how prokaryotic cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure.

BI1.f. *Students know* usable energy is captured from sunlight by chloroplasts and is stored through the synthesis of sugar from carbon dioxide.

THE GENETICS REPORTING CLUSTER

The following 10 California content standards are included in the Genetics reporting cluster and are represented in this booklet by six test questions. These questions represent only some ways in which these standards may be assessed on the California Life Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Genetics

Grade 7 Standards

- 7LS2. 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:**
- 7LS2.a.** *Students know* the differences between the life cycles and reproduction methods of sexual and asexual organisms.
- 7LS2.c.** *Students know* an inherited trait can be determined by one or more genes.
- 7LS2.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.
- 7LS2.e.** *Students know* DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

Biology/Life Science Standards

- BI2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:**
- BI2.b.** *Students know* only certain cells in a multicellular organism undergo meiosis.
- BI2.d.** *Students know* new combinations of alleles may be generated in a zygote through the fusion of male and female gametes (fertilization).
- BI2.e.** *Students know* why approximately half of an individual's DNA sequence comes from each parent.
- BI2.f.** *Students know* the role of chromosomes in determining an individual's sex.
- BI3. A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization. As a basis for understanding this concept:**
- BI3.a.** *Students know* how to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive).
- BI5. The genetic composition of cells can be altered by incorporation of exogenous DNA into the cells. As a basis for understanding this concept:**
- BI5.a.** *Students know* the general structures and functions of DNA, RNA, and protein.

THE ECOLOGY REPORTING CLUSTER

The following nine California content standards are included in the Ecology reporting cluster and are represented in this booklet by six test questions. These questions represent only some ways in which these standards may be assessed on the California Life Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Ecology

Grade 6 Standards

- 6LS5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. As a basis for understanding this concept:**
- 6LS5.b.** *Students know* matter is transferred over time from one organism to others in the food web and between organisms and the physical environment.
- 6LS5.c.** *Students know* populations of organisms can be categorized by the functions they serve in an ecosystem.
- 6LS5.e.** *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.

Biology/Life Science Standards

- BI6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:**
- BI6.a.** *Students know* biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.
- BI6.b.** *Students know* how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.
- BI6.c.** *Students know* how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.
- BI6.d.** *Students know* how water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration.
- BI6.e.** *Students know* a vital part of an ecosystem is the stability of its producers and decomposers.
- BI6.f.** *Students know* at each link in a food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in an energy pyramid.

THE EVOLUTION REPORTING CLUSTER

The following 10 California content standards are included in the Evolution reporting cluster and are represented in this booklet by five test questions. These questions represent only some ways in which these standards may be assessed on the California Life Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Evolution

Grade 7 Standards

- 7LS3. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:**
- 7LS3.a.** *Students know* both genetic variation and environmental factors are causes of evolution and diversity of organisms.
- 7LS3.b.** *Students know* the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.
- 7LS3.c.** *Students know* how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.

Biology/Life Science Standards

- BI7. 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:**
- BI7.a.** *Students know* why natural selection acts on the phenotype rather than the genotype of an organism.
- BI7.b.** *Students know* why alleles that are lethal in a homozygous individual may be carried in a heterozygote and thus maintained in a gene pool.
- BI7.c.** *Students know* new mutations are constantly being generated in a gene pool.
- BI7.d.** *Students know* variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions.
- BI8. Evolution is the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept:**
- BI8.a.** *Students know* how natural selection determines the differential survival of groups of organisms.
- BI8.b.** *Students know* a great diversity of species increases the chance that at least some organisms survive major changes in the environment.
- BI8.e.** *Students know* how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction.

THE PHYSIOLOGY REPORTING CLUSTER

The following eight California content standards are included in the Physiology reporting cluster and are represented in this booklet by five test questions. These questions represent only some ways in which these standards may be assessed on the California Life Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Physiology

Grade 7 Standards

- 7LS5.** **The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. As a basis for understanding this concept:**
- 7LS5.a.** *Students know* plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
- 7LS5.c.** *Students know* how bones and muscles work together to provide a structural framework for movement.
- 7LS6.** **Physical principles underlie biological structures and functions. As a basis for understanding this concept:**
- 7LS6.j.** *Students know* that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.

Biology/Life Science Standards

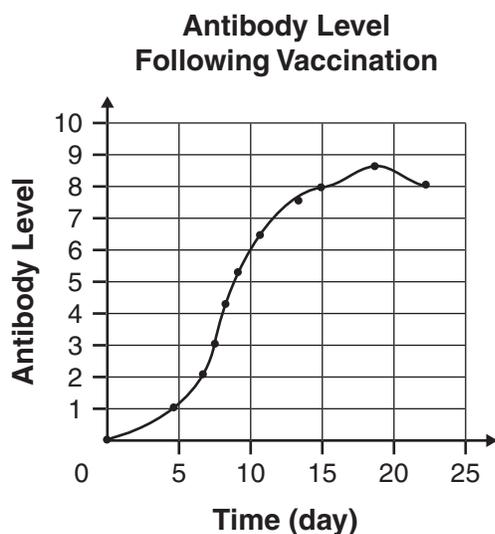
- BI9.** **As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment. As a basis for understanding this concept:**
- BI9.a.** *Students know* how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide.
- BI9.b.** *Students know* how the nervous system mediates communication between different parts of the body and the body's interactions with the environment.
- BI10.** **Organisms have a variety of mechanisms to combat disease. As a basis for understanding the human immune response:**
- BI10.b.** *Students know* the role of antibodies in the body's response to infection.
- BI10.c.** *Students know* how vaccination protects an individual from infectious diseases.
- BI10.d.** *Students know* there are important differences between bacteria and viruses with respect to their requirements for growth and replication, the body's primary defenses against bacterial and viral infections, and effective treatments of these infections.

Released Test Questions

Science

10

- 1 The graph below shows the production of antibodies following a flu shot.



Which of the following statements *best* describes the maximum antibody level of a person's body after a flu vaccination?

- A It occurs immediately.
- B It is never achieved.
- C It is achieved on day 15.
- D It is achieved on day 18.

CSZ30053

- 2 The jackrabbit population sometimes decreases dramatically. One possible explanation for this decrease is that the coyote population has increased. This explanation is a scientific

- A conclusion.
- B experiment.
- C hypothesis.
- D law.

CSZ30176

- 3 A mineral supplement designed to prevent the common cold was given to two groups of people during a scientific study.

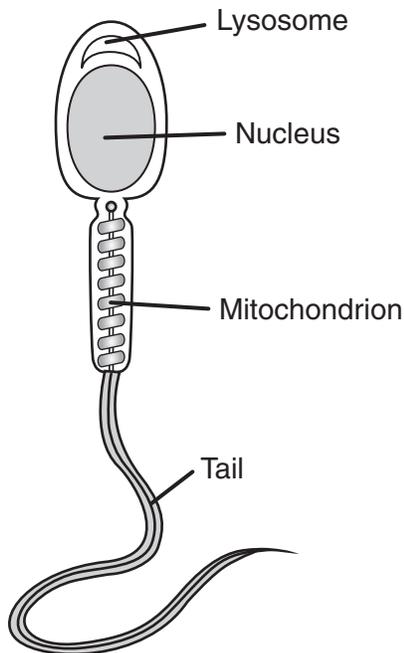
	Dosage
Group 1	50 $\frac{\text{mg}}{\text{day}}$
Group 2	100 $\frac{\text{mg}}{\text{day}}$

After eight weeks, neither group reported a case of the common cold. Which of the following would have made the outcome of this study more valid?

- A Test only one group with 150 mg of the supplement.
- B Give the supplement to both groups for only 6 weeks.
- C Create a third group that receives 75 mg of the supplement.
- D Create a third group that does not receive the supplement.

CSZ30523

- 4 The diagram below shows a male gamete.



Which structure stores *most* of the genetic information?

- A mitochondrion
- B lysosome
- C nucleus
- D tail

CSZ30809

- 5 Which of the following organelles releases energy from sugars?

- A ribosomes
- B vacuoles
- C chloroplasts
- D mitochondria

CSZ30247

- 6 Which of the following organelles use carbon dioxide to produce sugars?

- A vacuoles
- B ribosomes
- C chloroplasts
- D mitochondria

CSZ30250

- 7 Which of the following structures is *not* found in bacteria?

- A ribosome
- B cytoplasm
- C cell membrane
- D nuclear membrane

CSZ30749

- 8 Which of the following lacks a nucleus?

- A a plant cell
- B an animal cell
- C an amoeba
- D a virus

CSZ30628

- 9 The inheritance of a trait in humans is *best* described as being determined by

- A a single allele.
- B one or more pairs of alleles.
- C one pair of chromosomes.
- D the sex chromosomes of the offspring.

CSZ30911

Released Test Questions

Science

10

- 10** Which of the following cell types is formed by meiosis?

A muscle cells
 B sperm cells
 C skin cells
 D blood cells

CSZ30071

- 11** What process is necessary for the inherited traits of an organism to be passed along by sexual reproduction?

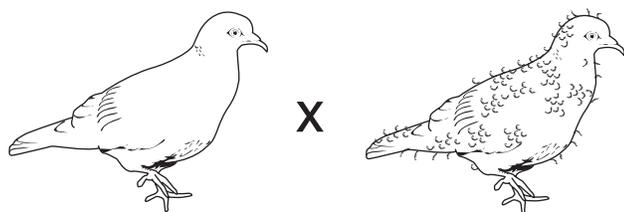
A mitosis
 B meiosis
 C mutation
 D fission

CSZ20950

- 12** In pigeons, the allele for normal feathers (F) is dominant to the allele for frizzy feathers (f).

Normal

Frizzy



If a purebred, normal-feathered bird (FF) is crossed with a frizzy-feathered bird (ff), how many different feather phenotypes are possible in the offspring?

A 1
 B 2
 C 3
 D 4

CSZ30826

- 13** In humans, the allele for unattached earlobes (L) is dominant to the allele for attached earlobes (l).

Punnett Square

	L	l
L	1	2
l	3	4

Based on the diagram above, an offspring with attached earlobes is indicated in

A box 1.
 B box 4.
 C boxes 2 and 3.
 D boxes 1, 2, and 3.

CSZ30797

- 14** Which of the following *best* describes the inheritance of a sex-linked trait?

A a recessive allele carried by females that affects only males
 B a dominant allele carried by females that affects only males
 C an allele carried on the Y chromosome that can affect both males and females
 D an allele carried on an X chromosome that can affect males or females

CSZ30915

- 15 The diagram below shows a marine food chain.

Phytoplankton → Zooplankton → Herring → Salmon

The zooplankton in this food chain are

- A primary producers.
- B primary consumers.
- C secondary consumers.
- D tertiary consumers.

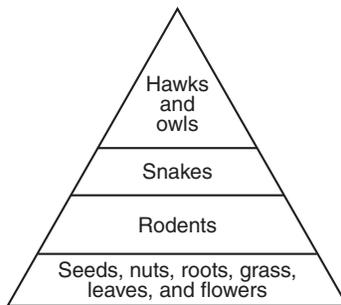
CSZ20937

- 16 The table below contains information about animal diets.

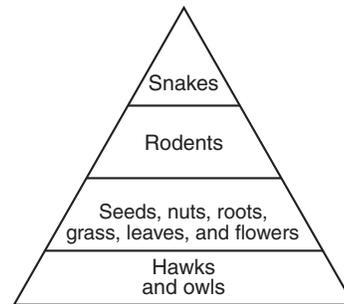
Animals	Diet
Snakes	Squirrels, chipmunks, gophers, and mice
Hawks and owls	Rodents and reptiles
Rodents	Seeds, nuts, roots, grass, leaves, and flowers

Which energy pyramid *best* represents the data in the table?

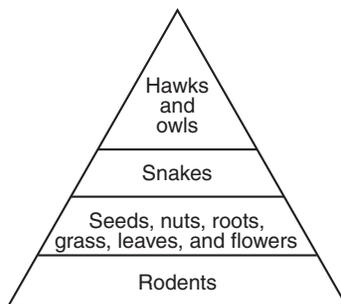
A



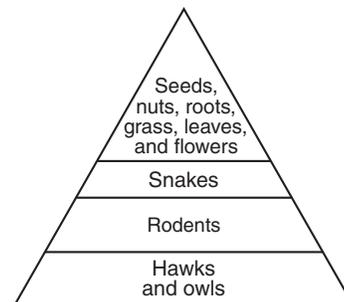
C



B



D



CSZ20924

Released Test Questions

Science

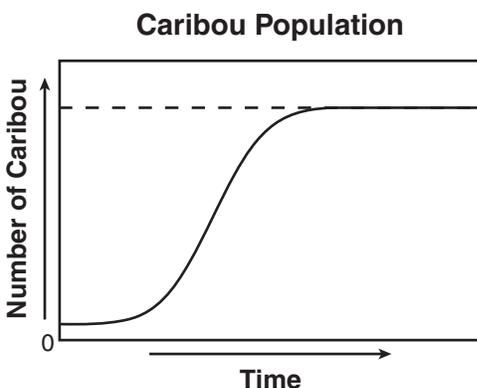
10

- 17** Which of the following sets of organisms would be found in a wetland ecosystem?

A tortoise, lizard, fly
 B salamander, mosquito, frog
 C moose, seal, lemming
 D lion, giraffe, beetle

CSZ30197

- 18** The graph below shows changes in a caribou population over time.



Based on the graph, which of the following is a possible explanation for the stabilization of the caribou population?

A an equal number of deaths and births
 B an unequal number of deaths and births
 C an equal number of immigrants and births
 D an unequal number of immigrants and deaths

CSZ30062

- 19** During photosynthesis in plants, what is the source of the carbon in the sugar molecule ($C_6H_{12}O_6$)?

A carbon dioxide in the air
 B carbon monoxide in the air
 C carbon particles in the soil
 D carbon particles in water

CSZ20951

- 20** Which of the following processes allows the cells of an organism to use carbon from the environment?

A mitosis
 B fertilization
 C transpiration
 D photosynthesis

CSZ30635

- 21** How is natural selection in the evolution of long necks in giraffes *best* explained?

A Shorter-necked giraffes were killed by long-necked giraffes.
 B Giraffe necks grew longer because of the bone structure of the animals.
 C Giraffes with longer necks survived because they were better suited to the environment.
 D Long-necked giraffes mated only with other long-necked giraffes.

CSZ30526

- 22** Which of the following explains why natural selection acts on the phenotype of an organism instead of its genotype?

A Phenotypes directly influence the interaction of an organism with its environment.
 B Genotypes do not change except by the process of transcription.
 C Genotypes change in direct response to habitat changes.
 D Phenotypes can be inherited by offspring.

CSZ30403

23 A particular allele in mice is lethal in homozygotes. Heterozygotes, however, develop normally. Why does this allele remain in the population?

- A Homozygous mice pass the allele to their offspring.
- B The recessive allele is masked in heterozygotes.
- C Natural selection selects for the homozygous individual with normal alleles.
- D Natural selection selects against the heterozygous individual.

CSZ30530

24 Rainfall in a tropical region is below average for 10 consecutive years. Insect species adapted for dry conditions are much more plentiful at the end of the 10 years. Which of the following statements *best* explains the increase in the population of these insects?

- A Biodiversity in the region has increased due to the dry conditions.
- B Insects with a high tolerance for dry conditions have migrated out of the region.
- C Natural selection has favored insect species with a high tolerance for dry conditions.
- D Natural selection has selected against insect species that are adapted for dry conditions.

CSZ30531

25 Skeletal structures are common between two animals of different species. These structures probably exist because both species

- A have a common food source.
- B live in the same environment.
- C have survived until the present time.
- D are related to a common ancestor.

CSZ30396

26 Which of the following pairs provides structural support for a human?

- A skin and blood
- B bones and muscles
- C spine and heart
- D brain and nerves

CSZ30626

27 Which three human-body systems coordinate to cause an arm to move?

- A nervous, muscular, skeletal
- B respiratory, muscular, digestive
- C skeletal, circulatory, immune
- D digestive, nervous, circulatory

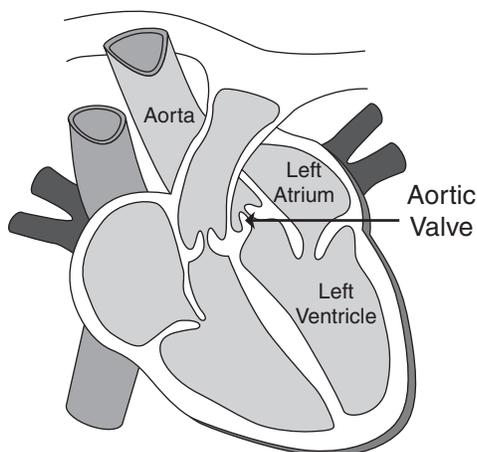
CSZ30894

Released Test Questions

Science

10

- 28** The diagram below shows a human heart.



When contracted, the left ventricle pumps oxygenated blood to the body. What is the purpose of the aortic valve that separates the left ventricle from the aorta?

- A to prevent blood from flowing back into the left ventricle
- B to prevent blood from flowing into the aorta
- C to push blood into the left ventricle
- D to push blood into the aorta

CSZ20974

- 29** How do nutrients, absorbed by the small intestine, travel to the individual cells of the human body?

- A The nutrients are absorbed from the small intestine into the blood and move through the circulatory system to the body cells.
- B The nutrients move from the small intestine directly to the liver and then move through the lymphatic system to the body cells.
- C The small intestine forces the nutrients into the kidneys, where the nutrients are then dissolved in fluids used by the body cells.
- D The body cells send nerve impulses indicating a lack of nutrients to the small intestine, and the small intestine sends the nutrients back to the cells.

CSZ30926

- 30** The purpose for giving a person a vaccine is to

- A introduce chemicals that destroy viruses.
- B stimulate an immune response.
- C prevent inflammation.
- D cure a disease.

CSZ30427

Question Number	Correct Answer	Standard	Year of Release
1	<i>D</i>	6LSIE7.C	2006
2	<i>C</i>	7LSIE7.C	2007
3	<i>D</i>	BIIE1.J	2006
4	<i>C</i>	7LS1.C	2006
5	<i>D</i>	7LS1.D	2007
6	<i>C</i>	7LS1.D	2007
7	<i>D</i>	BI1.C	2006
8	<i>D</i>	BI1.C	2007
9	<i>B</i>	7LS2.C	2006
10	<i>B</i>	BI2.B	2006
11	<i>B</i>	BI2.B	2007
12	<i>A</i>	BI2.D	2007
13	<i>B</i>	BI3.A	2006
14	<i>D</i>	BI3.A	2007
15	<i>B</i>	6LS5.B	2007
16	<i>A</i>	6LS5.C	2006
17	<i>B</i>	6LS5.E	2006
18	<i>A</i>	BI6.C	2006
19	<i>A</i>	BI6.D	2007
20	<i>D</i>	BI6.D	2007
21	<i>C</i>	7LS3.B	2006
22	<i>A</i>	BI7.A	2007
23	<i>B</i>	BI7.B	2006
24	<i>C</i>	BI8.B	2007
25	<i>D</i>	BI8.E	2006
26	<i>B</i>	7LS5.C	2006
27	<i>A</i>	7LS5.C	2007
28	<i>A</i>	7LS6.J	2007
29	<i>A</i>	BI9.A	2007
30	<i>B</i>	BI10.C	2006