

## Introduction - Earth Science

The following released test questions are taken from the Earth 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 Earth 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 forms in 2003, 2004, 2005, 2006, 2007, and 2008. First on the pages that follow are lists of the standards assessed on the Earth 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 last appeared on the test. It should be noted that asterisked (\*) standards found in the *Science Content Standards for California Public Schools, Kindergarten through Grade 12*, are not assessed on the California Standards Tests in Science and, therefore, are not represented in these released test questions.

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. The released test questions for Biology, Chemistry, Earth Science, and Physics are the same test questions found in different combinations on the Integrated Science 1, 2, 3, and 4 tests.

REPORTING CLUSTER	NUMBER OF QUESTIONS ON EXAM	NUMBER OF RELEASED TEST QUESTIONS
Investigation and Experimentation (Standards: ES1E1. a-n)	6	7
Astronomy and Cosmology <i>Earth's Place in the Universe</i> (Standards: ES1. a-f, ES2. a-d)	12	20
Solid Earth <i>Dynamic Earth Processes</i> (Standards: ES3. a-e) <i>California Geology</i> (Standards: ES9. a-c)	14	21
The Earth's Energy <i>Energy in the Earth System</i> (Standards: ES4. a-c, ES5. a-e, ES6. a-c) <i>Biogeochemical Cycles</i> (Standards: ES7. a-c) <i>Structure and Composition of the Atmosphere</i> (Standards: ES8. a-c)	28	41
TOTAL	60	89

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 Earth Science Test; (2) the questions demonstrate a range of difficulty; and (3) the questions present 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 14 California content standards are included in the Investigation and Experimentation reporting cluster and are represented in this booklet by seven test questions. These questions represent only some ways in which these standards may be assessed on the California Earth Science Standards Test.

### CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

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#### Investigation and Experimentation

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- ESIE1.** 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 reporting clusters, students should develop their own questions and perform investigations. Students will:
- 
- ESIE1. a.** Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.
- 
- ESIE1. b.** Identify and communicate sources of unavoidable experimental error.
- 
- ESIE1. c.** Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- 
- ESIE1. d.** Formulate explanations by using logic and evidence.
- 
- ESIE1. e.** Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.
- 
- ESIE1. f.** Distinguish between hypothesis and theory as scientific terms.
- 
- ESIE1. g.** Recognize the usefulness and limitations of models and theories as scientific representations of reality.
- 
- ESIE1. h.** Read and interpret topographic and geologic maps.
- 
- ESIE1. 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).
- 
- ESIE1. j.** Recognize the issues of statistical variability and the need for controlled tests.
- 
- ESIE1. k.** Recognize the cumulative nature of scientific evidence.
- 
- ESIE1. l.** Analyze situations and solve problems that require combining and applying concepts from more than one area of science.
- 
- ESIE1. m.** Investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings. Examples of issues include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources, and land and water use decisions in California.
- 
- ESIE1. n.** Know that when an observation does not agree with an accepted scientific theory, the observation is sometimes mistaken or fraudulent (e.g., the Piltdown Man fossil or unidentified flying objects) and that the theory is sometimes wrong (e.g., the Ptolemaic model of the movement of the Sun, Moon, and planets).
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## THE ASTRONOMY AND COSMOLOGY REPORTING CLUSTER

The following 10 California content standards are included in the Astronomy and Cosmology reporting cluster and are represented in this booklet by 20 test questions. These questions represent only some ways in which these standards may be assessed on the California Earth Science Standards Test.

### CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

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#### Earth's Place in the Universe

<b>ES1.</b>	<b>Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time. As a basis for understanding this concept:</b>
<b>ES1. a.</b>	<i>Students know</i> how the differences and similarities among the sun, the terrestrial planets, and the gas planets may have been established during the formation of the solar system.
<b>ES1. b.</b>	<i>Students know</i> the evidence from Earth and moon rocks indicates that the solar system was formed from a nebular cloud of dust and gas approximately 4.6 billion years ago.
<b>ES1. c.</b>	<i>Students know</i> the evidence from geological studies of Earth and other planets suggests that the early Earth was very different from Earth today.
<b>ES1. d.</b>	<i>Students know</i> the evidence indicating that the planets are much closer to Earth than the stars are.
<b>ES1. e.</b>	<i>Students know</i> the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium.
<b>ES1. f.</b>	<i>Students know</i> the evidence for the dramatic effects that asteroid impacts have had in shaping the surface of planets and their moons and in mass extinctions of life on Earth.
<b>ES2.</b>	<b>Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time. As a basis for understanding this concept:</b>
<b>ES2. a.</b>	<i>Students know</i> the solar system is located in an outer edge of the disc-shaped Milky Way galaxy, which spans 100,000 light years.
<b>ES2. b.</b>	<i>Students know</i> galaxies are made of billions of stars and comprise most of the visible mass of the universe.
<b>ES2. c.</b>	<i>Students know</i> the evidence indicating that all elements with an atomic number greater than that of lithium have been formed by nuclear fusion in stars.
<b>ES2. d.</b>	<i>Students know</i> that stars differ in their life cycles and that visual, radio, and X-ray telescopes may be used to collect data that reveal those differences.

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## THE SOLID EARTH REPORTING CLUSTER

The following eight California content standards are included in the Solid Earth reporting cluster and are represented in this booklet by 21 test questions. These questions represent only some ways in which these standards may be assessed on the California Earth Science Standards Test.

### CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

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#### Dynamic Earth Processes

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|----------------|--|
| <b>ES3.</b>    | <b>Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth's surface. As the basis for understanding this concept:</b>            |
| <b>ES3. a.</b> | <i>Students know</i> features of the ocean floor (magnetic patterns, age, and sea-floor topography) provide evidence of plate tectonics.   |
| <b>ES3. b.</b> | <i>Students know</i> the principal structures that form at the three different kinds of plate boundaries.  |
| <b>ES3. c.</b> | <i>Students know</i> how to explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonic processes.                  |
| <b>ES3. d.</b> | <i>Students know</i> why and how earthquakes occur and the scales used to measure their intensity and magnitude.   |
| <b>ES3. e.</b> | <i>Students know</i> there are two kinds of volcanoes: one kind with violent eruptions producing steep slopes and the other kind with voluminous lava flows producing gentle slopes. |

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#### California Geology

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|----------------|---|
| <b>ES9.</b>    | <b>The geology of California underlies the state's wealth of natural resources as well as its natural hazards. As a basis for understanding this concept:</b> |
| <b>ES9. a.</b> | <i>Students know</i> the resources of major economic importance in California and their relation to California's geology.                                     |
| <b>ES9. b.</b> | <i>Students know</i> the principal natural hazards in different California regions and the geologic basis of those hazards.                                   |
| <b>ES9. c.</b> | <i>Students know</i> the importance of water to society, the origins of California's fresh water, and the relationship between supply and need.               |
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## THE EARTH'S ENERGY REPORTING CLUSTER

The following 17 California content standards are included in The Earth's Energy reporting cluster and are represented in this booklet by 42 test questions. These questions represent only some ways in which these standards may be assessed on the California Earth Science Standards Test.

### CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

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#### Energy in the Earth System

<b>ES4.</b>	<b>Energy enters the Earth system primarily as solar radiation and eventually escapes as heat. As a basis for understanding this concept:</b>
<b>ES4. a.</b>	<i>Students know</i> the relative amount of incoming solar energy compared with Earth's internal energy and the energy used by society.
<b>ES4. b.</b>	<i>Students know</i> the fate of incoming solar radiation in terms of reflection, absorption, and photosynthesis.
<b>ES4. c.</b>	<i>Students know</i> the different atmospheric gases that absorb the Earth's thermal radiation and the mechanism and significance of the greenhouse effect.
<b>ES5.</b>	<b>Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents. As a basis for understanding this concept:</b>
<b>ES5. a.</b>	<i>Students know</i> how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat.
<b>ES5. b.</b>	<i>Students know</i> the relationship between the rotation of Earth and the circular motions of ocean currents and air in pressure centers.
<b>ES5. c.</b>	<i>Students know</i> the origin and effects of temperature inversions.
<b>ES5. d.</b>	<i>Students know</i> properties of ocean water, such as temperature and salinity, can be used to explain the layered structure of the oceans, the generation of horizontal and vertical ocean currents, and the geographic distribution of marine organisms.
<b>ES5. e.</b>	<i>Students know</i> rain forests and deserts on Earth are distributed in bands at specific latitudes.
<b>ES6.</b>	<b>Climate is the long-term average of a region's weather and depends on many factors. As a basis for understanding this concept:</b>
<b>ES6. a.</b>	<i>Students know</i> weather (in the short run) and climate (in the long run) involve the transfer of energy into and out of the atmosphere.
<b>ES6. b.</b>	<i>Students know</i> the effects on climate of latitude, elevation, topography, and proximity to large bodies of water and cold or warm ocean currents.
<b>ES6. c.</b>	<i>Students know</i> how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors, such as solar radiation and plate movement.

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**Biogeochemical Cycles**

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**ES7.** Each element on Earth moves among reservoirs, which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles. As a basis for understanding this concept:

**ES7. a.** *Students know* the carbon cycle of photosynthesis and respiration and the nitrogen cycle.

**ES7. b.** *Students know* the global carbon cycle: the different physical and chemical forms of carbon in the atmosphere, oceans, biomass, fossil fuels, and the movement of carbon among these reservoirs.

**ES7. c.** *Students know* the movement of matter among reservoirs is driven by Earth's internal and external sources of energy.

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**Structure and Composition of the Atmosphere**

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**ES8.** Life has changed Earth's atmosphere, and changes in the atmosphere affect conditions for life. As a basis for understanding this concept:

**ES8. a.** *Students know* the thermal structure and chemical composition of the atmosphere.

**ES8. b.** *Students know* how the composition of Earth's atmosphere has evolved over geologic time and know the effect of outgassing, the variations of carbon dioxide concentration, and the origin of atmospheric oxygen.

**ES8. c.** *Students know* the location of the ozone layer in the upper atmosphere, its role in absorbing ultraviolet radiation, and the way in which this layer varies both naturally and in response to human activities.

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## Earth Science

## Released Test Questions

**1** A teacher demonstrated the possible effects of acid rain by placing several types of rocks in separate beakers containing a vinegar solution with a pH of 3. As time passed, some of the solutions retained a pH of 3 while other solutions gradually reached a pH of 7. Which of the following *best* explains this variation of pH in this demonstration?

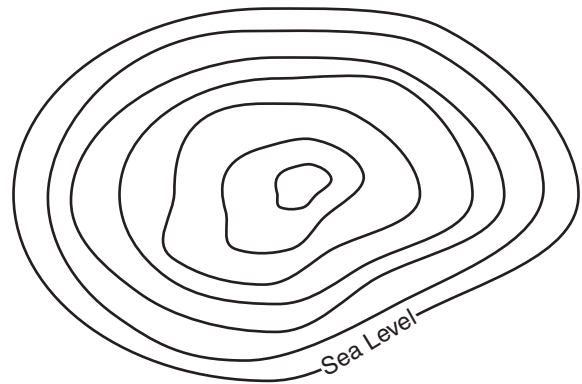
- A All solutions eventually reach a pH of 7, so the experiment is not complete.
- B Vinegar is an organic compound that reacts unpredictably with inorganic rocks.
- C The rocks have varying chemical composition, so some but not all of them react with acid.
- D The students should have measured the pH immediately after mixing since acid rain reacts quickly in nature.

CSY10614

**2** A day on Saturn takes about 10 Earth hours. Which fact would *best* explain this short day?

- A Saturn is less dense than Earth.
- B Saturn is much farther from the Sun than Earth.
- C Saturn rotates more rapidly than Earth.
- D Saturn's orbit has greater eccentricity than Earth's.

CSS00098

**3**

Contour Interval - 5 meters

The highest elevation on this topographic map can be no more than about

- A 25 meters.
- B 34 meters.
- C 45 meters.
- D 49 meters.

CSS00090

**4** In an area where a river has cut deep into Earth, there are several layers of very different rock exposed. The oldest rock layer is *most* likely to be the layer that is

- A below the other layers.
- B the thickest layer.
- C the most rich in fossils.
- D igneous intrusive rock.

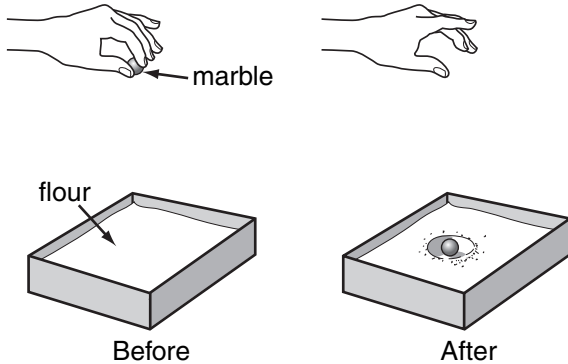
CSS00004



## Released Test Questions

## Earth Science

5



A student models an impact crater on the Moon by dropping a marble from a known height onto a pan of smooth flour. Before reaching any conclusions about the results of this simple experiment, the student repeats the activity several times so that

- A differences produced by standard variability in conditions become clear.
- B she can produce as large a crater as possible before measuring a diameter.
- C her ability to simulate a meteor impact becomes more realistic with practice.
- D she can illustrate a perfectly circular crater for her write-up of the experiment.

CSY10617

6

The existence of extraterrestrial life may never be proven, but this idea will become more scientifically acceptable over time if

- A no one disputes this idea in a scientific forum.
- B hypotheses are made related to the idea.
- C alternative hypotheses are proposed and confirmed.
- D increasing scientific evidence supports the idea.

CSS00025

7

An astronomer notes the change in position of Mars over several nights and then calculates that Mars orbits the Sun once every 400 Earth days. This figure is considerably lower than the 687 Earth-day orbit that is widely accepted for Mars. The scientist should

- A publish the findings to reveal the flaw in established orbital theories.
- B form a hypothesis to explain how the orbit of Mars can vary so greatly.
- C gather a new set of data and see if the results remain the same.
- D add 287 days to the calculations to match the accepted figure.

CSY10241

8

Which of the following statements *best* describes how the planets of the solar system formed?

- A They are condensed rings of matter thrown off by the young Sun.
- B They are the remains of an exploded star once paired with the Sun.
- C The Sun captured them from smaller, older nearby stars.
- D They formed from a nebular cloud of dust and gas.

CSY10242

9

Which planet was formed from the light gases of the outer solar nebula?

- A Mars
- B Mercury
- C Venus
- D Uranus

CSY10465

## Earth Science

## Released Test Questions

**10** The diameter of Saturn is almost ten times that of the Earth, yet its density is much less. This can *best* be explained by the fact that Saturn

- A is farther from the Sun.
- B is a gaseous planet.
- C has a shorter period of rotation.
- D has a ring around its center.

CSS00144

**11** Evidence suggests that Earth is about 4.6 billion years old, even though no Earth rocks have been found that can be dated at more than 4 billion years old. This discrepancy is *most* likely caused by Earth's original crust being

- A difficult to date so precisely.
- B subject to extensive erosion.
- C blasted away during Earth's formation.
- D destroyed by solar radiation.

CSS00041

**12** It has been determined that the oldest rocks retrieved from the Moon by Apollo astronauts were formed 4.44 billion years ago, while the oldest rocks found on Earth are less than 4 billion years old. This difference is *most* likely because

- A Earth formed well after the Moon was formed.
- B Earth cooled more slowly than the Moon.
- C Earth's oldest rocks have been recycled by plate tectonics and erosion.
- D Earth and the Moon were both captured by the Sun's gravity at different times.

CSY10110

**13** Before humans visited the Moon and brought back lunar rocks, the age of the Moon was unknown. Radioisotope dating of these rocks showed that the age of the oldest lunar rock was closest to

- A 186,000 years.
- B 6.5 million years.
- C 4.4 billion years.
- D 15 billion years.

CSY20357

**14** Which of the following is the best evidence that Earth's continents were once in vastly different positions than they are today?

- A Penguins are found only in the Southern Hemisphere.
- B Fossils of tropical plants are found in Antarctica.
- C Volcanoes encircle the Pacific Ocean.
- D Major rivers form deltas from continental erosion.

CSS00182

**15** Early telescopes showed stars as only points of light, while the planets appeared to be much larger, providing evidence that stars must

- A be more plentiful in our solar system than planets.
- B travel in elliptical orbits like planets.
- C be much farther from Earth than planets.
- D reflect much more light than planets.

CSS00171

## Released Test Questions

## Earth Science

**16** Although many ancient civilizations designated certain patterns of stars as constellations, they never included planets in their constellations. What feature of planets, as opposed to stars, explains this?

- A They look bigger than stars.
- B They are more difficult to see than stars.
- C There are not enough of them to form a constellation.
- D They do not maintain fixed positions relative to other planets or stars.

CSY10253

**17** Before the telescope was invented, people had the idea that the planets were closer to Earth than were the stars. Which piece of evidence contributed to this conclusion?

- A The planets were the only objects with visible moons.
- B The Milky Way was sometimes visible during the day.
- C The stars were consistently brighter than the planets.
- D The planets appeared to move much more quickly than the stars.

CSY10104

**18** What is the source of energy for the Sun?

- A hydrogen fusion
- B internal combustion
- C nuclear fission of metals
- D burning of solar gases

CSS00166

**19** Fusion is a form of nuclear reaction resulting in an enormous release of heat energy. The fusion of hydrogen to helium is a reaction that commonly occurs in

- A the Sun and other typical stars.
- B the ionosphere and thermosphere.
- C Earth's outer core of molten iron.
- D a comet's tail of ionized gases.

CSY10050

**20** The surfaces of planet Mercury and our moon contain some very large craters that are *most* likely the result of

- A giant lava flows.
- B asteroid impacts.
- C nuclear explosions.
- D large collapsed caves.

CSS00080

**21** The Sun is an average yellow star in the Milky Way galaxy, which is described as

- A a dwarf galaxy.
- B a spiral galaxy.
- C an elliptical galaxy.
- D an irregular galaxy.

CSS00249

**22** As part of the modern theory of the origins of the elements, it is hypothesized that before the formation of the stars, most of the matter in the universe consisted of what atoms?

- A hydrogen and helium
- B nitrogen and carbon
- C silicon and lithium
- D uranium and radium

CSY10277

## Earth Science

## Released Test Questions

**23** Scientific evidence suggests that magnesium is formed by stars during

- A photosynthesis.
- B the fission of carbon atoms.
- C nuclear fusion.
- D convection inside sunspots.

CSY20767

**24** Stars begin their life cycle in

- A a black hole.
- B a nova.
- C a nebula.
- D a supernova.

CSS00277

**25** Astronomers have discovered vast differences in stars through their observations. One theory used to explain these differences is that

- A the distances between stars are vast.
- B stars are at different points in their life cycles.
- C Earth's atmosphere distorts our view of the stars.
- D there is too much light pollution on Earth to study stars.

CSS00161

**26** An astronomer uses a telescope to observe a star. The color of the star indicates that it has a size and surface temperature similar to that of the Sun. Using this information, the astronomer can conclude that the star

- A is older than the Sun.
- B will survive for several billion years.
- C is moving very quickly away from Earth.
- D has a mass similar to the mass of Jupiter.

CSY20735

**27** The final stage of a star's existence is determined by its mass. The most massive stars will end their lives as

- A supergiant stars.
- B neutron stars.
- C white dwarf stars.
- D black holes.

CSS00242

**28** Which of the following provides evidence for plate tectonics?

- A sea-floor topography
- B ocean currents
- C Coriolis effect
- D atmospheric temperatures

CSS00325

**29** The youngest rocks on the ocean floor are typically located near what feature?

- A a mid-ocean ridge
- B a continental shelf
- C an abyssal plain
- D a subduction trench

CSY20105

**30** A rift valley is evidence of which kind of plate boundary?

- A convergent
- B divergent
- C transform
- D uniform

CSS00311

## Released Test Questions

## Earth Science

**31** The convergence of two continental plates would produce

- A island arcs.
- B rift valleys.
- C folded mountains.
- D trenches.

CSS00270

**32** Which of the following is *most* responsible for the formation of new crust at the edge of a tectonic plate?

- A mountain building at a continent-continent convergent boundary
- B magma rising up from the mantle at a divergent boundary
- C two tectonic plates sliding past one another at a transform boundary
- D subduction of one oceanic plate under another at a convergent boundary

CSY20681

**33** It is generally true that igneous rocks

- A contain primarily evaporites.
- B can be scratched with a penny.
- C normally contain fossils.
- D are composed of silicate minerals.

CSS00217

**34** Relative cooling rates of igneous intrusive rocks can be estimated by comparing rocks'

- A crystal sizes.
- B composition.
- C density.
- D chemical reactivity.

CSS00128

**35** Which of the following is *most* likely to produce a fragmental sedimentary rock?

- A magma fractured on the ocean floor
- B calcite crystallized from seawater
- C gravel deposited in a silt bed
- D limestone dissolved in cave formation

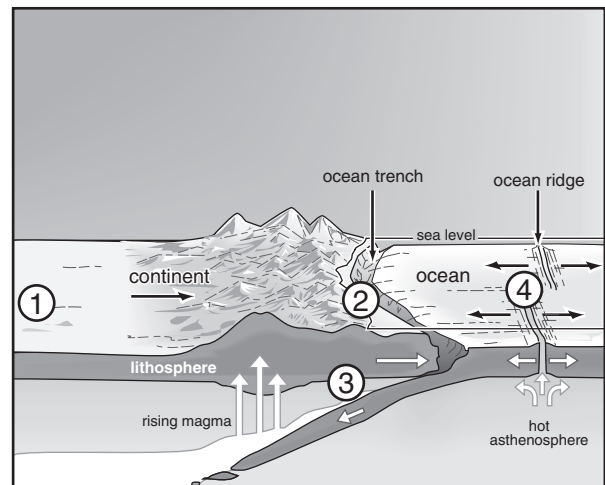
CSY20010

**36** Earthquake vibrations are detected, measured, and recorded by instruments called

- A sonargraphs.
- B seismographs.
- C Richter scales.
- D magnetometers.

CSS00243

**37**



At which location would earthquakes be *least* likely to occur?

- A 1
- B 2
- C 3
- D 4

CSS00143

## Earth Science

## Released Test Questions

**38** The Richter scale measures which of the following earthquake characteristics?

- A intensity
- B magnitude
- C frequency
- D probability

CSY20685

**39** Which type of volcano would be the *least* explosive?

- A cinder cone
- B stratovolcano
- C shield volcano
- D composite cone

CSS00251

**40** Which of the following energy sources is *most* likely to be abundant in California due to its position on a plate boundary?

- A wind
- B nuclear
- C solar
- D geothermal

CSS00132

**41** What energy resource is made possible by the volcanic activity in California?

- A hydroelectricity
- B nuclear power
- C geothermal energy
- D solar energy

CSS00142

**42** Geothermal energy is possible where there is

- A wind.
- B oil.
- C coal.
- D magma.

CSY20638

**43** The Long Valley Caldera in east-central California was formed by a massive volcanic eruption about 760,000 years ago. Since then, it has erupted several times. Of the following, which would be *least* likely to indicate that another eruption will soon occur?

- A recurring earthquakes in the vicinity
- B decreases in precipitation in the area
- C changes in gas emissions from the caldera
- D uplifting of the floor of the caldera

CSS00158

**44** Earthquake activity in California is primarily caused by

- A the lowering of aquifer levels.
- B the interaction of tides with the coast.
- C mining activity during the nineteenth century.
- D plates grinding past each other along active faults.

CSY10538

**45** Landslides in California are caused by a combination of environmental factors, such as heavy precipitation, and geologic factors, such as

- A karst topography and poor drainage.
- B crust folding and artesian springs.
- C reverse faulting and perched water tables.
- D steep topography and unstable soil structure.

CSS00305

## Released Test Questions

## Earth Science

- 46** The main purpose of the California aqueduct is to
- A allow inexpensive water routes for transporting commercial products.
  - B transport fresh water to areas with dense populations.
  - C divert floodwater from populated regions to sparsely populated areas.
  - D provide abundant ocean water to drier regions of California.

CSS00304

- 47** Water is important to many different types of industry. Which industry's water requirement is the greatest burden on California's fresh water supply?

- A aerospace
- B manufacturing
- C tourism
- D agriculture

CSY10539

- 48** The majority of freshwater in California is used for

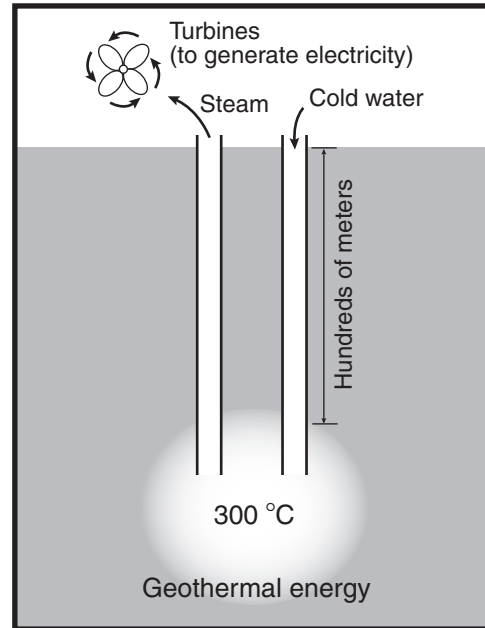
- A drinking.
- B agriculture.
- C livestock.
- D fire fighting.

CSY20634

- 49** Only about 50% of the solar energy directed toward Earth penetrates directly to the surface. What happens to the rest of the radiation?

- A It is absorbed or reflected by the atmosphere.
- B It loses energy traveling through space.
- C It is reflected off the Moon and back into space.
- D It loses energy overcoming the Sun's gravity.

CSY10139

**50**

**Geothermal energy, a possible energy resource, is based on which phenomenon?**

- A There are concentrations of heat in some places of Earth's crust.
- B Earth's internal energy heats its surface more than the Sun does.
- C Heat energy from the Sun penetrates deep into Earth.
- D Human activity is the largest source of heat energy on Earth.

CSY10328

- 51** The Moon is very hot on the side facing the Sun and very cold on the dark side. This extreme temperature difference is primarily due to the Moon's

- A mineral composition.
- B thin atmosphere.
- C reflective rocks.
- D lack of volcanic activity.

CSS00150

## Earth Science

## Released Test Questions

- 52** Venus is warmed by solar radiation, but its thick cloud cover increases the temperature because the clouds
- A prevent the escape of heat into space.
  - B convert solar radiation into heat.
  - C absorb short light wavelengths, leaving heat.
  - D produce heat as they are pushed by strong winds.

CSS00104

- 53** Which of these could increase average global temperatures?
- A increased use of fossil fuels
  - B increased ocean algal blooms
  - C decreased carbon dioxide emissions
  - D increased numbers of animal species

CSS00252

- 54** The clouds that surround Venus are so thick that the planet actually absorbs less sunlight than the Earth. Nevertheless, Venus has a surface temperature of more than 400 °C. Which of these *best* explains this high surface temperature?
- A The bright surfaces of the clouds reflect sunlight back on the planet.
  - B The strong winds in the atmosphere produce friction.
  - C The thick clouds in the atmosphere prevent heat from escaping.
  - D The sulfuric acid in the clouds releases heat energy.

CSS00165

- 55** Permanent deforestation can contribute to potential global warming by
- A decreasing atmospheric CO<sub>2</sub> levels.
  - B increasing atmospheric CO<sub>2</sub> levels.
  - C decreasing atmospheric N<sub>2</sub> levels.
  - D increasing atmospheric N<sub>2</sub> levels.

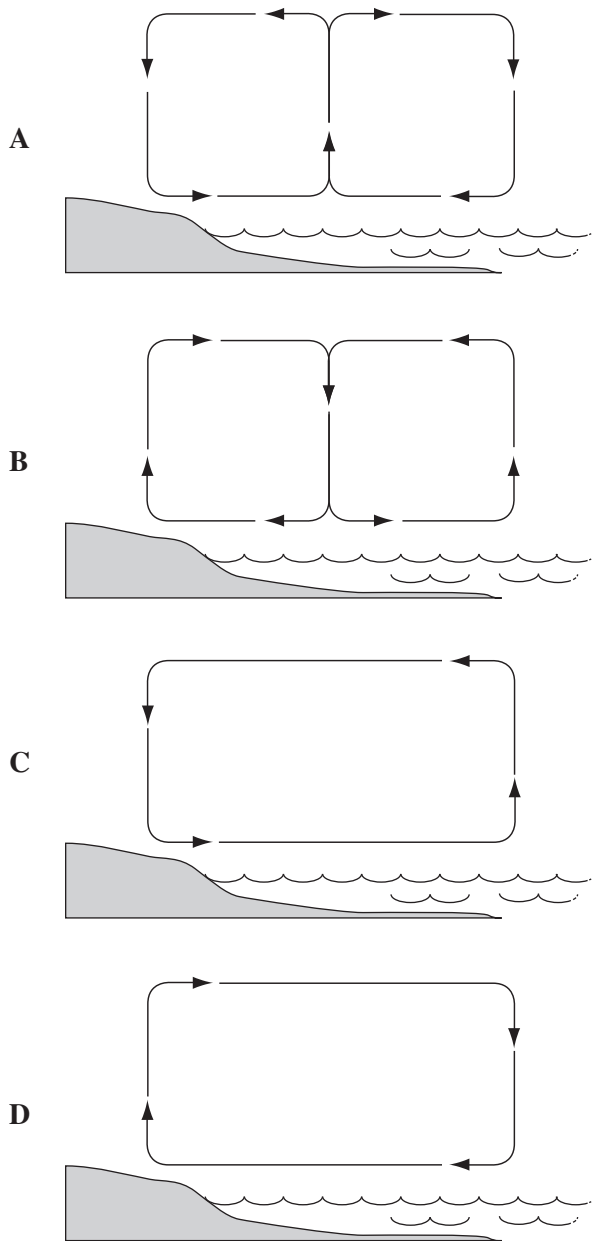
CSY20044

- 56** More solar energy reaches the equatorial regions than the polar regions because the equatorial regions
- A are covered by a greater area of land.
  - B have more vegetation to absorb sunlight.
  - C have days with more hours of light.
  - D receive sun rays closest to vertical.

CSS00160



**57** Which diagram *best* models the movement of coastal air during the afternoon?



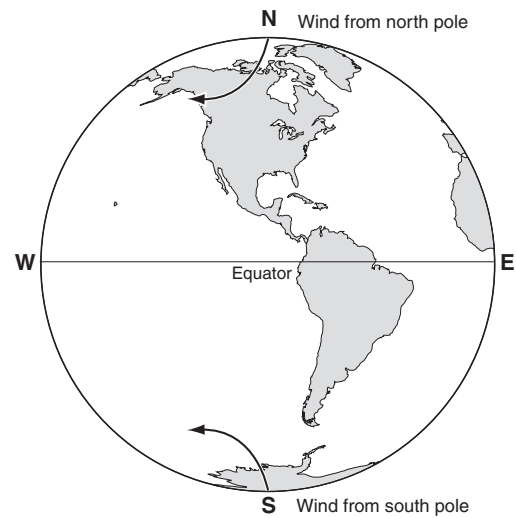
CSS00044

**58** What is the driving force for surface ocean currents?

- A density layering
- B global winds
- C the Coriolis effect
- D salt concentration

CSY20113

**59**



What causes the wind deflection from the north and south poles?

- A the rotation of Earth on its axis
- B the oblate shape of Earth
- C the tilt of Earth's axis relative to its orbital plane
- D the difference in total land mass of the two hemispheres

CSS00145

## Earth Science

## Released Test Questions

**60** Air moving from the poles toward the equator turns west. The primary cause of this global deflection is

- A the shape and size of land masses.
- B larger cities surrounded by farmlands.
- C changes in the magnetic field.
- D the rotation of the planet.

CSS00198

**61** Earth rotates in an easterly direction. Therefore, southward wind currents in the Northern Hemisphere appear to be deflected to the

- A east.
- B west.
- C north.
- D south.

CSY20315

**62** When a layer of cool air at the surface of Earth is found under a layer of warmer air above it, the result is known as

- A the Coriolis effect.
- B the greenhouse effect.
- C a temperature inversion.
- D an upwelling.

CSY10148

**63** Temperature inversions can occur when

- A hot air rises during the night and sinks during the day.
- B air is heated directly by solar radiation.
- C cool air becomes trapped below warm air.
- D places are warmer in winter than summer.

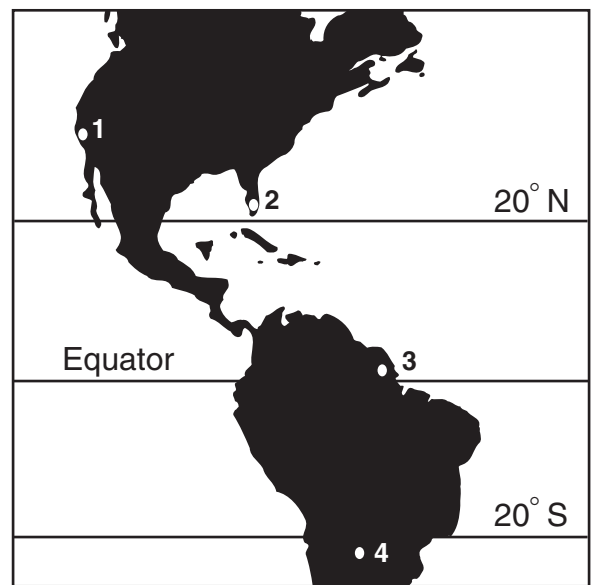
CSS00169

**64** Ocean surface currents are created by

- A differences in water temperature.
- B differences in water density.
- C friction with winds.
- D salinity variations.

CSS00291

**65**



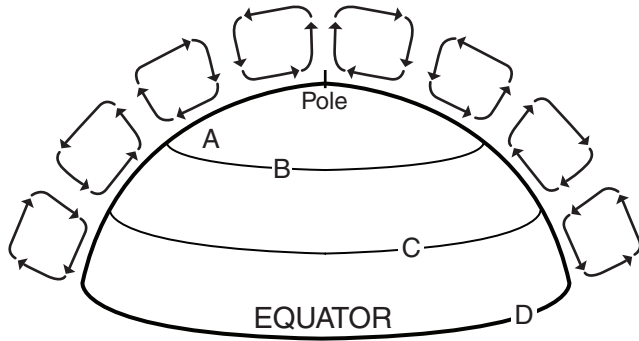
At which location on the map would a rain forest *most* likely be found?

- A 1
- B 2
- C 3
- D 4

CSY10379

66

## Wind Patterns of Planet X



Where would deserts *most* likely be found on Planet X?

- A A
- B B
- C C
- D D

CSS00109

67 Which of these effects generally occurs as the result of a warm air mass and a cooler air mass converging at Earth's surface?

- A The sky becomes clear.
- B Winds die down.
- C Cloud formation decreases.
- D Stormy weather patterns develop.

CSS00180

68 Snow on the ground prevents polar climates from gaining heat by what mechanism?

- A heating by greenhouse gases
- B heat spread from the equator
- C reflection of solar radiation
- D release of heat from Earth's core

CSY10384

69

Shifts in Earth's continents *most* likely caused a change in Earth's

- A climatic regions.
- B mass.
- C orbital velocity.
- D atmospheric temperature.

CSS00149

70

The Gulf Stream in the Northern Hemisphere and the Brazilian Current in the Southern Hemisphere move poleward. Compared to inland areas at the same latitude, the coastal areas bordering these currents will

- A be warmer.
- B be more arid.
- C have more advection fogs.
- D have shorter growing seasons.

CSS00186

71

When comparing temperatures of two California regions of the same latitude, students found that the nighttime temperature dropped significantly at the desert site but only slightly at the coastal site. This difference is mostly caused by

- A lower wind speeds in the desert than at the coast.
- B less water vapor in the desert than at the coast.
- C lower carbon dioxide levels in the desert than at the coast.
- D less vegetation in the desert than at the coast.

CSY50118

## Earth Science

## Released Test Questions

**72** Scientists have found fossils of tropical plants in Antarctica. How could tropical plants have grown in Antarctica?

- A At one time, Earth's entire surface was a tropical rain forest.
- B At one time, Antarctica was located closer to the equator.
- C The rotation of Earth has increased, causing cooling of the atmosphere.
- D Catastrophic volcanic eruptions melted the ice and exposed the soil to sunlight.

CSY20119

**73** Which of the following was made possible by the presence of photosynthetic bacteria on Earth?

- A a water cycle
- B an oxygen cycle
- C carbon fixation
- D anaerobic respiration

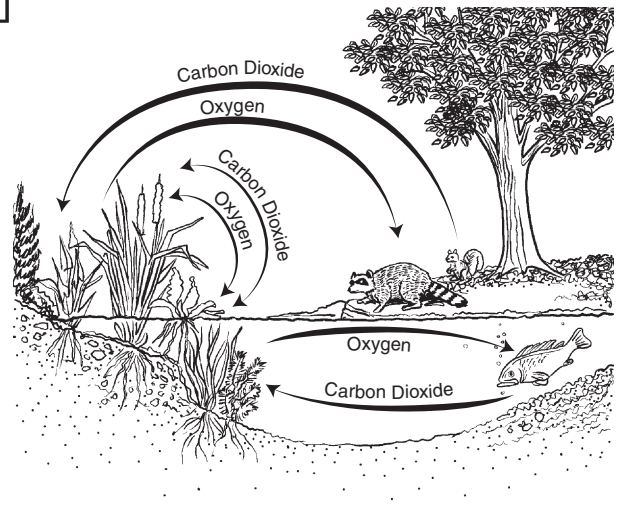
CSY10028

**74** What piece of evidence supports the theory that volcanic eruptions formed Earth's early atmosphere?

- A Volcanoes expel gases with chemical compositions which closely match the ratios of non-photosynthetic gases in air.
- B Volcanoes are clustered near the equator, so their gas output spreads over Earth's surface.
- C Volcanoes expel a mixture of gases consisting almost entirely of water vapor and oxygen.
- D Volcanic eruptions are inversely proportional to local atmospheric pressure.

CSY10416

75



Which of these statements is *best* illustrated by this diagram?

- A Animals under water eat plants.
- B Land animals exhale oxygen into water.
- C Water-dwelling animals breathe carbon dioxide.
- D Plants can take in carbon dioxide from air or water.

CSS00146

**76** From Earth's atmosphere, carbon dioxide is used by plants, algae, and cyanobacteria during the process of

- A photosynthesis.
- B respiration.
- C decomposition.
- D nitrogen fixation.

CSY10172

## Released Test Questions

## Earth Science

77

Analysis of Gases From a Hawaiian Volcano

Gas	Amount
H <sub>2</sub> O (steam)	79%
CO <sub>2</sub>	12%
SO <sub>2</sub>	6.5%
N <sub>2</sub>	1.5%
H <sub>2</sub> , CO, Cl <sub>2</sub> , and Ar	trace

The table above lists the gases coming from a modern Hawaiian volcano. If ancient volcanoes gave off the same gases, which gas would have been *most* helpful in the development of early life-forms that could carry out photosynthesis?

- A N<sub>2</sub>
- B SO<sub>2</sub>
- C CO<sub>2</sub>
- D Cl<sub>2</sub>

CSS00163

78

Carbon in the atmosphere is *most* often found as which of the following compounds?

- A stratospheric ozone
- B fossil fuel
- C carbon monoxide
- D carbon dioxide

CSY20671

79

Which of the following processes puts carbon from a forest floor back into the atmosphere?

- A combustion
- B photosynthesis
- C evaporation
- D transpiration

CSY20585

80

The release of carbon from limestone reservoirs into the atmosphere is *most* often accomplished by the

- A abrasion of the limestone by wind-blown sands.
- B destruction of limestone by lichens.
- C formation of stalagmites and stalactites in limestone caves.
- D chemical reaction between limestone and rainwater.

CSS00152

81

During periods of increased global temperatures, which of the following is *most* likely to occur?

- A a decrease in atmospheric CO<sub>2</sub>
- B an increase in atmospheric CO<sub>2</sub>
- C a decrease in earthquakes
- D an increase in earthquakes

CSY10533

82

Earth's atmosphere is divided into layers that are based upon their

- A water content.
- B relative humidity.
- C gas content.
- D temperature gradient.

CSS00265

83

According to many scientists, what process led to the formation of the early atmosphere of Earth?

- A outgassing
- B metamorphism
- C asteroid collision
- D galactic dust

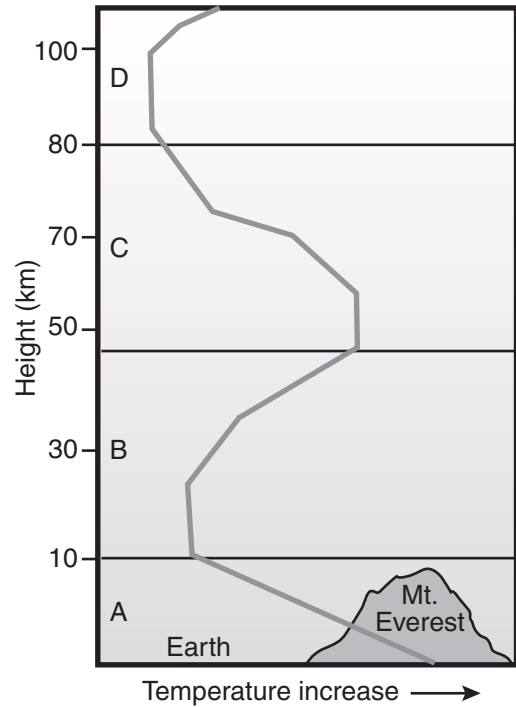
CSY50041

**84** According to scientists, which of the following material categories is thought to be the primary cause for the depletion of the ozone layer?

- A chlorofluorocarbons
- B coal-containing sulfur
- C fossil fuels
- D hydrocarbons

CSY10219

**85**



The diagram above shows four layers of Earth’s atmosphere. Which of the following correctly labels the layers represented by A, B, C, and D (from Earth moving upward) in the correct sequence?

- A troposphere, stratosphere, mesosphere, thermosphere
- B thermosphere, mesosphere, stratosphere, troposphere
- C troposphere, mesosphere, thermosphere, stratosphere
- D mesosphere, troposphere, thermosphere, stratosphere

CSY10211

## Released Test Questions

## Earth Science

**86** The primitive atmosphere of Earth was deficient in free oxygen. What process was primarily responsible for the development of the present percentage of free oxygen in the Earth's atmosphere?

- A outgassing
- B photosynthesis
- C volcanic eruptions
- D oxidation of iron-based minerals

CSS00164

**87** Most of the molecular oxygen in the early atmosphere of Earth resulted from

- A photosynthesis in primitive plants.
- B decaying primitive plants and animals.
- C volcanic eruptions.
- D lightning striking Earth.

CSY10213

**88** The first atmosphere that formed above Earth was *most likely* due to what process?

- A eruption of volcanoes
- B movement of water
- C development of land plants
- D occurrence of violent storms

CSY20135

**89** Which of the following human activities reduces the level of ozone in the atmosphere?

- A using artificial lighting in scientific polar stations
- B using large banks of solar cells for energy production
- C releasing chlorofluorocarbons from aerosol cans
- D destroying large areas of the equatorial rain forests

CSS00148

Question Number	Correct Answer	Standard	Year of Release
1	<i>C</i>	ESIE1.C	2006
2	<i>C</i>	ESIE1.D	2004
3	<i>B</i>	ESIE1.H	2003
4	<i>A</i>	ESIE1.I	2004
5	<i>A</i>	ESIE1.J	2006
6	<i>D</i>	ESIE1.K	2005
7	<i>C</i>	ESIE1.N	2008
8	<i>D</i>	ES1.A	2005
9	<i>D</i>	ES1.A	2006
10	<i>B</i>	ES1.A	2008
11	<i>B</i>	ES1.B	2004
12	<i>C</i>	ES1.B	2007
13	<i>C</i>	ES1.B	2007
14	<i>B</i>	ES1.C	2003
15	<i>C</i>	ES1.D	2004
16	<i>D</i>	ES1.D	2006
17	<i>D</i>	ES1.D	2008
18	<i>A</i>	ES1.E	2003
19	<i>A</i>	ES1.E	2006
20	<i>B</i>	ES1.F	2004
21	<i>B</i>	ES2.A	2003
22	<i>A</i>	ES2.C	2005
23	<i>C</i>	ES2.C	2008
24	<i>C</i>	ES2.D	2004
25	<i>B</i>	ES2.D	2005
26	<i>B</i>	ES2.D	2007
27	<i>D</i>	ES2.D	2008
28	<i>A</i>	ES3.A	2003
29	<i>A</i>	ES3.A	2008
30	<i>B</i>	ES3.B	2004
31	<i>C</i>	ES3.B	2004
32	<i>B</i>	ES3.B	2007
33	<i>D</i>	ES3.C	2005
34	<i>A</i>	ES3.C	2006
35	<i>C</i>	ES3.C	2007



Question Number	Correct Answer	Standard	Year of Release
36	<i>B</i>	ES3.D	2003
37	<i>A</i>	ES3.D	2004
38	<i>B</i>	ES3.D	2006
39	<i>C</i>	ES3.E	2005
40	<i>D</i>	ES9.A	2003
41	<i>C</i>	ES9.A	2005
42	<i>D</i>	ES9.A	2006
43	<i>B</i>	ES9.B	2004
44	<i>D</i>	ES9.B	2005
45	<i>D</i>	ES9.B	2008
46	<i>B</i>	ES9.C	2004
47	<i>D</i>	ES9.C	2007
48	<i>B</i>	ES9.C	2008
49	<i>A</i>	ES4.A	2005
50	<i>A</i>	ES4.A	2006
51	<i>B</i>	ES4.B	2003
52	<i>A</i>	ES4.B	2006
53	<i>A</i>	ES4.C	2004
54	<i>C</i>	ES4.C	2005
55	<i>D</i>	ES4.C	2008
56	<i>D</i>	ES5.A	2003
57	<i>D</i>	ES5.A	2004
58	<i>B</i>	ES5.A	2007
59	<i>A</i>	ES5.B	2003
60	<i>D</i>	ES5.B	2006
61	<i>B</i>	ES5.B	2008
62	<i>C</i>	ES5.C	2006
63	<i>C</i>	ES5.C	2007
64	<i>C</i>	ES5.D	2007
65	<i>C</i>	ES5.E	2005
66	<i>C</i>	ES5.E	2007
67	<i>D</i>	ES6.A	2004
68	<i>C</i>	ES6.A	2006
69	<i>A</i>	ES6.B	2003
70	<i>A</i>	ES6.B	2003

Question Number	Correct Answer	Standard	Year of Release
71	<i>B</i>	ES6.B	2008
72	<i>B</i>	ES6.C	2005
73	<i>B</i>	ES6.C	2007
74	<i>A</i>	ES6.C	2008
75	<i>D</i>	ES7.A	2004
76	<i>A</i>	ES7.A	2005
77	<i>C</i>	ES7.B	2003
78	<i>D</i>	ES7.B	2006
79	<i>A</i>	ES7.B	2008
80	<i>D</i>	ES7.C	2007
81	<i>B</i>	ES7.C	2007
82	<i>D</i>	ES8.A	2003
83	<i>A</i>	ES8.B	2008
84	<i>A</i>	ES8.C	2008
85	<i>A</i>	ES8.A	2005
86	<i>B</i>	ES8.B	2005
87	<i>A</i>	ES8.B	2006
88	<i>A</i>	ES8.B	2007
89	<i>C</i>	ES8.C	2003