

## Life Science; Ch. 8; Earth's History

### Multiple Choice

*Identify the choice that best completes the statement or answers the question.*

- \_\_\_\_\_ 1. A series of processes on Earth's surface and in the crust and mantle that slowly changes rocks from one kind to another is called
  - a. erosion.
  - b. crystallization.
  - c. the rock cycle.
  - d. evaporation.
- \_\_\_\_\_ 2. Which of the following is NOT one of the possible stages in the rock cycle?
  - a. volcanic activity
  - b. erosion
  - c. smelting
  - d. melting
- \_\_\_\_\_ 3. What step in the rock cycle would be required to change granite into sandstone?
  - a. Granite particles settle on the ocean floor.
  - b. Lava flows melt the granite sediment.
  - c. Pieces of the granite melt when they return to the mantle by subduction.
  - d. Magma hardens into granite sediment.
- \_\_\_\_\_ 4. Erosion on a mountain range that was pushed up as a result of two continental plates colliding will lead to the formation of
  - a. igneous rock.
  - b. metamorphic rock.
  - c. magma.
  - d. sedimentary rock.
- \_\_\_\_\_ 5. During the rock cycle, a collision between two continental plates could force one plate down toward the heat of the mantle, producing
  - a. coarse-grained rock.
  - b. metamorphic rock.
  - c. igneous rock.
  - d. sedimentary rock.
- \_\_\_\_\_ 6. The relative age of a rock is
  - a. its age compared to the ages of other rocks.
  - b. less than the age of the fossils the rock contains.
  - c. the number of years since the rock formed.
  - d. its age based on how much carbon-14 the rock contains.
- \_\_\_\_\_ 7. The law of superposition states that, in horizontal layers of sedimentary rock, each layer is
  - a. younger than the layer above it and older than the layer below it.
  - b. neither older nor younger than the other layers.
  - c. older than the layer above it and younger than the layer below it.
  - d. always older than any vertical layers.

- \_\_\_\_\_ 8. What is the age of an intrusion of igneous rock in relation to the sedimentary rock layers through which it passes?
  - a. sometimes younger, sometimes older
  - b. always older
  - c. the same age as the other rock layers
  - d. always younger
- \_\_\_\_\_ 9. The fossils of organisms that were widely distributed but only lived during a short period of time are called
  - a. trace fossils.
  - b. petrified fossils.
  - c. index fossils.
  - d. carbon film fossils.
- \_\_\_\_\_ 10. Why are index fossils useful to geologists?
  - a. They tell the absolute age of the rock in which they occur.
  - b. They tell the ages of many different rock layers.
  - c. They tell the age of the rock at one location only.
  - d. They tell the relative age of the rock in which they occur.
- \_\_\_\_\_ 11. Radioactive decay occurs when atoms of an unstable element
  - a. become part of a fossil.
  - b. join with atoms of another element.
  - c. break down to form atoms of another element.
  - d. are exposed to chemical weathering.
- \_\_\_\_\_ 12. The time it takes for half of the radioactive atoms in a sample of a radioactive element to decay is the element's
  - a. relative age.
  - b. potassium-argon date.
  - c. absolute age.
  - d. half-life.
- \_\_\_\_\_ 13. Radioactive dating enables geologists to determine
  - a. the age of the atoms in a rock.
  - b. the half-life of a fossil organism.
  - c. the relative ages of rocks.
  - d. the absolute ages of rocks.
- \_\_\_\_\_ 14. Radioactive dating works best with what type of rocks?
  - a. igneous rocks
  - b. sedimentary rocks
  - c. metamorphic rocks
  - d. fossilized rocks
- \_\_\_\_\_ 15. Precambrian Time, which includes most of Earth's history, began with
  - a. an ice age.
  - b. Earth forming from a mass of dust and gas.
  - c. an asteroid impact.
  - d. the formation of thick deposits of sediment.
- \_\_\_\_\_ 16. The geological theory that states that pieces of Earth's outer layer are in constant, slow motion is the theory of

- a. subduction.
  - b. plate tectonics.
  - c. deep-ocean trenches.
  - d. sea-floor spreading.
- \_\_\_\_\_ 17. If one of Earth's plates moves 5 centimeters every year, how far will it move in 500 years?
- a. 25 kilometers
  - b. 25 centimeters
  - c. 25 meters
  - d. 250 meters
- \_\_\_\_\_ 18. Earth's plates move a few millimeters to several centimeters each
- a. day.
  - b. week.
  - c. month.
  - d. year.
- \_\_\_\_\_ 19. Knowing the average speed of Earth's plates helps scientists
- a. avoid collisions between the plates.
  - b. feel the plates moving.
  - c. predict future changes.
  - d. prevent earthquakes.
- \_\_\_\_\_ 20. The geologic time scale is a record of
- a. the thickness of sedimentary rock layers.
  - b. the rate of fossil formation.
  - c. the life forms and geologic events in Earth's history.
  - d. the time since the evolution of dinosaurs.
- \_\_\_\_\_ 21. How did Earth change about 2.5 billion years ago when many organisms began using photosynthesis to make food?
- a. The amount of oxygen in the atmosphere increased.
  - b. Mass extinctions occurred.
  - c. The oceans became larger.
  - d. Rainfall increased.
- \_\_\_\_\_ 22. About 260 million years ago, Earth's continents moved together to form the supercontinent called
- a. Antarctica.
  - b. Cambria.
  - c. North America.
  - d. Pangaea.
- \_\_\_\_\_ 23. During the Cambrian Explosion that began the Paleozoic Era, the many new forms of life that evolved
- a. lived on land.
  - b. were invertebrates that lived in the sea.
  - c. were vertebrates covered with scales or fur.
  - d. were single-celled.
- \_\_\_\_\_ 24. During the Devonian Period, animals that could live on land began to evolve. These animals still spent part of their lives in the water. What were these animals called?
- a. trilobites
  - b. reptiles

- c. amphibians
  - d. dinosaurs
- \_\_\_\_\_ 25. What do most scientists think caused the mass extinction of dinosaurs and other organisms at the end of the Cretaceous Period?
- a. Volcanic eruptions covered large areas with lava.
  - b. An object from space struck Earth.
  - c. An ice age covered most of Earth with ice.
  - d. The dinosaurs ate too many other organisms and then starved.
- \_\_\_\_\_ 26. Hutton's observations of the geologic forces around him allowed him to infer that these same geologic processes had operated in the past. This idea is now referred to as
- a. the rock cycle.
  - b. the law of superposition.
  - c. the principle of uncomformity.
  - d. the principle of uniformitarianism.
- \_\_\_\_\_ 27. The continents have changed location over time because of
- a. the rock cycle.
  - b. volcanoes.
  - c. earthquakes along fault lines.
  - d. the movement of Earth's plates.
- \_\_\_\_\_ 28. You are looking at a fossil of a Precambrian organism that is 3.5 billion years old fossil. What were the organism's distinguishing characteristics? It was a(n)
- a. single-celled organism.
  - b. vertebrate jawless fish.
  - c. invertebrate jellyfish.
  - d. land-dwelling reptile.
- \_\_\_\_\_ 29. Australia's unique communities of marsupials may be explained by
- a. human activities that have killed off marsupials everywhere else.
  - b. Australia's former location in northern latitudes.
  - c. the Permian extinction, which wiped out marsupials in other parts of the world.
  - d. isolated evolution due to continental drift.
- \_\_\_\_\_ 30. Two ways in which continental drift might affect evolution are
- a. isolation of populations and climate change with change of latitude.
  - b. isolation of populations and an increase in floods.
  - c. an increase in floods and climate change with change of latitude.
  - d. isolation of marsupials and a decrease in floods.

### Modified True/False

*Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.*

- \_\_\_\_\_ 31. Plate movements drive the process of erosion by pushing rock back into the mantle, where it melts and becomes magma again. \_\_\_\_\_
- \_\_\_\_\_ 32. Each major group of rocks follows only one pathway in the rock cycle.  
\_\_\_\_\_

- \_\_\_\_\_ 33. The law of superposition helps geologists determine the absolute age of a rock layer.  
\_\_\_\_\_
- \_\_\_\_\_ 34. Rock layers are always younger than the faults that cut across them.  
\_\_\_\_\_
- \_\_\_\_\_ 35. Geologists divide Earth's long history into smaller units that make up the geologic time scale.  
\_\_\_\_\_
- \_\_\_\_\_ 36. Life on Earth first appeared during the Cambrian Period. \_\_\_\_\_
- \_\_\_\_\_ 37. At the beginning of the Paleozoic Era, a great number of different types of organisms evolved in an event called the Cambrian Explosion. \_\_\_\_\_
- \_\_\_\_\_ 38. The ozone layer was necessary to protect life from ultraviolet rays when organisms first moved onto land. \_\_\_\_\_
- \_\_\_\_\_ 39. Scientists believe that the sun is 4.6 billion years old, approximately the same age as Earth.  
\_\_\_\_\_
- \_\_\_\_\_ 40. The continents resemble a jigsaw puzzle because they were once part of a supercontinent called Pangaea, according to the law of superposition. \_\_\_\_\_

### **Completion**

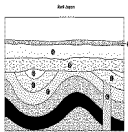
*Complete each statement.*

41. A series of processes known as the \_\_\_\_\_ slowly changes rocks from one kind to another kind.
42. The uplift, folding, and faulting that move rocks through the rock cycle are caused by movements of Earth's tectonic \_\_\_\_\_.
43. A rock layer's \_\_\_\_\_ age is its age compared to the ages of other rock layers.
44. A(n) \_\_\_\_\_ is a gap in the geologic record where some rock layers have been lost because of erosion.
45. Certain ammonites are used as \_\_\_\_\_ fossils because they lived in many different areas but for only a brief time.
46. The breakdown of unstable carbon-14 to form stable nitrogen-14 is an example of \_\_\_\_\_ decay.
47. The time it takes for one half of the atoms in a sample of a radioactive element to decay is called the element's \_\_\_\_\_.
48. Potassium-40 is useful for dating very old rocks because it has a(n) \_\_\_\_\_ of 1.3 billion years.
49. Geologists use the radioactive element \_\_\_\_\_ to determine the age of organic remains, such as bone.
50. Scientists hypothesize that Earth formed at the same time as the other planets and the sun, roughly \_\_\_\_\_ years ago.

51. Jawless fish were Earth's first \_\_\_\_\_, or animals with backbones.
52. The mass extinction at the end of the Paleozoic Era may have occurred because Earth's \_\_\_\_\_ moved together into one large landmass, changing Earth's climate.
53. Reptiles, such as dinosaurs, were so successful during the \_\_\_\_\_ Era that this time is often called the Age of Reptiles.
54. Life first appeared around 3.5 billion years ago, about \_\_\_\_\_ years after the formation of Earth.
55. The idea that all geological formations are the result of unique, sudden, catastrophic events was popular until the principle of \_\_\_\_\_ showed that geological processes operating today are the same as geological processes in the past.
56. You know that saber-toothed cats went extinct during the most recent Quaternary ice age. To determine the age of a saber-toothed cat fossil you would use \_\_\_\_\_ dating.
57. Fossilized sand dunes similar to active sand dunes in the Gobi desert provide support for the principle of \_\_\_\_\_.
58. A fossil organism that is widely distributed and that existed only briefly may serve as a(n) \_\_\_\_\_ that helps geologists date rock layers.
59. Historians consider time in terms of millenia that are subdivided into centuries; geologists consider time in terms of \_\_\_\_\_ that are subdivided into periods.
60. You find fossils of a dinosaur on the east coast of South America. Your colleague finds fossils of the same species on the west coast of Africa. You are not surprised, because the theory of \_\_\_\_\_ explains how these two areas were once joined.

## Short Answer

*Use the diagram to answer each question.*

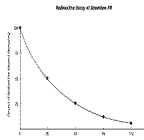


61. Which sedimentary rock layer is older, A or B? Explain your answer and name the scientific law that you applied to reach your conclusion.
62. List layers E, D, and C in order from oldest to youngest.
63. How do layers B and D compare in age? If rock layers between B and D have eroded away, what is the boundary between B and D called?
64. Layer F is an igneous extrusion. How could a geologist use layer F to infer the age of layer A.
65. G began as magma that hardened underground to form igneous rock. What is the age of G in relation to C? What term applies to bodies of rock such as G?

66. If layer C is sedimentary rock and layer G is igneous rock, which would be more likely to contain fossils? Explain your answer.

Strontium-90 is a radioactive form of the element strontium that undergoes radioactive decay. The graph shows the decay of strontium-90 over time.

*Use the diagram to answer each question.*



*Time in Years*

67. What is the half-life of strontium-90? Explain your answer.
68. How long will it take until only 25 percent of the strontium-90 remains?
69. If the graph represents the decay of strontium-90 in an igneous rock, what event occurred at 0 years on the horizontal axis?
70. Based on the graph, what can you say about the amount of time it will take for the strontium-90 to decay completely?
71. In general, how does the amount of strontium-90 change over time?
72. Would strontium-90 be useful for determining the age of fossils? Explain your answer.

## Essay

73. Explain how a grain of sand that washes up on a beach could end up some day as lava pouring from a volcano.
74. Contrast the relative and absolute age of a rock.
75. Define index fossils and state what geologists learn from them.
76. Two satellite tracking stations are on two of Earth's plates that are moving toward each other. One plate is moving east at a rate of 5 cm/yr. The other plate is moving west at a rate of 5 cm/yr. If the stations are now separated by 200 km, in how many years will the stations be 198 km apart? Explain.
77. Define the geologic time scale and explain why geologists use it to show Earth's history.
78. Name one or more common organisms that lived or lives during each of the three eras of geologic time.
79. Describe a scientific theory that explains the mass extinction of dinosaurs and many other organisms at the end of the Cretaceous Period.
80. Explain how the theory of plate tectonics relates to geologic time, the rock cycle and the theory of evolution.

## Life Science; Ch. 8; Earth's History

### Answer Section

#### MULTIPLE CHOICE

1. ANS: C PTS: 1 DIF: L1  
OBJ: CaLS.8.1.2 Describe the rock cycle. STA: S 7.4.c  
BLM: knowledge
2. ANS: C PTS: 1 DIF: L1  
OBJ: CaLS.8.1.2 Describe the rock cycle. STA: S 7.4.c  
BLM: knowledge
3. ANS: A PTS: 1 DIF: L2  
OBJ: CaLS.8.1.2 Describe the rock cycle. STA: S 7.4.c  
BLM: comprehension
4. ANS: D PTS: 1 DIF: L2  
OBJ: CaLS.8.1.2 Describe the rock cycle. STA: S 7.4.c  
BLM: comprehension
5. ANS: B PTS: 1 DIF: L2  
OBJ: CaLS.8.1.2 Describe the rock cycle. STA: S 7.4.c  
BLM: comprehension
6. ANS: A PTS: 1 DIF: L1  
OBJ: CaLS.8.2.1 State the law of superposition. STA: S 7.4.c  
BLM: knowledge
7. ANS: C PTS: 1 DIF: L1  
OBJ: CaLS.8.2.1 State the law of superposition. STA: S 7.4.c  
BLM: knowledge
8. ANS: D PTS: 1 DIF: L1  
OBJ: CaLS.8.2.2 Describe how geologists determine the relative age of rocks.  
STA: S 7.4.c BLM: knowledge
9. ANS: C PTS: 1 DIF: L1  
OBJ: CaLS.8.2.3 Explain how index fossils are useful to geologists.  
STA: S 7.4.c BLM: knowledge
10. ANS: D PTS: 1 DIF: L1  
OBJ: CaLS.8.2.3 Explain how index fossils are useful to geologists.  
STA: S 7.4.c BLM: knowledge
11. ANS: C PTS: 1 DIF: L1  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.  
STA: S 7.4.d BLM: knowledge
12. ANS: D PTS: 1 DIF: L1  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.  
STA: S 7.4.d BLM: knowledge
13. ANS: D PTS: 1 DIF: L1  
OBJ: CaLS.8.3.2 Describe what can be learned from radioactive dating.  
STA: S 7.4.d BLM: knowledge



14. ANS: A PTS: 1 DIF: L2  
OBJ: CaLS.8.3.2 Describe what can be learned from radioactive dating.  
STA: S 7.4.d BLM: application
15. ANS: B PTS: 1 DIF: L2  
OBJ: CaLS.8.3.3 State the probable age of Earth. STA: S 7.4.d  
BLM: comprehension
16. ANS: B PTS: 1 DIF: L1  
OBJ: CaLS.8.4.1 Use the theory of plate tectonics to explain the movement of Earth's landmasses.  
STA: S 7.4.f BLM: knowledge
17. ANS: C PTS: 1 DIF: L2  
OBJ: CaLS.8.4.1 Use the theory of plate tectonics to explain the movement of Earth's landmasses.  
STA: S 7.4.f BLM: analysis
18. ANS: D PTS: 1 DIF: L1  
OBJ: CaLS.8.4.1 Use the theory of plate tectonics to explain the movement of Earth's landmasses.  
STA: S 7.4.f BLM: knowledge
19. ANS: C PTS: 1 DIF: L2  
OBJ: CaLS.8.4.2 Describe how the movement of Earth's plates has affected organisms.  
STA: S 7.4.f BLM: comprehension
20. ANS: C PTS: 1 DIF: L1  
OBJ: CaLS.8.5.1 Explain why the geologic time scale is used to show Earth's history.  
STA: S 7.4.b BLM: knowledge
21. ANS: A PTS: 1 DIF: L2  
OBJ: CaLS.8.5.2 Describe what early Precambrian organisms were like.  
STA: S 7.4.g BLM: comprehension
22. ANS: D PTS: 1 DIF: L1  
OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.  
STA: S 7.4.g BLM: knowledge
23. ANS: B PTS: 1 DIF: L2  
OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.  
STA: S 7.4.g BLM: comprehension
24. ANS: C PTS: 1 DIF: L1  
OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.  
STA: S 7.4.g BLM: knowledge
25. ANS: B PTS: 1 DIF: L2  
OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.  
STA: S 7.4.g BLM: comprehension
26. ANS: D PTS: 1 DIF: L2  
OBJ: CaLS.8.1.1 Explain what uniformitarianism is. STA: S 7.4.a  
BLM: comprehension
27. ANS: D PTS: 1 DIF: L2  
OBJ: CaLS.8.4.1 Use the theory of plate tectonics to explain the movement of Earth's landmasses.

- STA: S 7.4.f      BLM: comprehension  
28. ANS: A      PTS: 1      DIF: L2  
OBJ: CaLS.8.5.2 Describe what early Precambrian organisms were like.  
STA: S 7.4.e      BLM: application  
29. ANS: D      PTS: 1      DIF: L2  
OBJ: CaLS.8.4.2 Describe how the movement of Earth's plates has affected organisms.  
STA: S 7.4.f      BLM: comprehension  
30. ANS: A      PTS: 1      DIF: L3  
OBJ: CaLS.8.4.2 Describe how the movement of Earth's plates has affected organisms.  
STA: S 7.4.f      BLM: synthesis

### MODIFIED TRUE/FALSE

31. ANS: F, rock cycle  
PTS: 1      DIF: L1      OBJ: CaLS.8.1.2 Describe the rock cycle.  
STA: S 7.4.c      BLM: knowledge  
32. ANS: F, many pathways  
PTS: 1      DIF: L2      OBJ: CaLS.8.1.2 Describe the rock cycle.  
STA: S 7.4.c      BLM: comprehension  
33. ANS: F, relative  
PTS: 1      DIF: L1      OBJ: CaLS.8.2.1 State the law of superposition.  
STA: S 7.4.c      BLM: knowledge  
34. ANS: F, older  
PTS: 1      DIF: L1  
OBJ: CaLS.8.2.2 Describe how geologists determine the relative age of rocks.  
STA: S 7.4.c      BLM: knowledge  
35. ANS: T      PTS: 1      DIF: L1  
OBJ: CaLS.8.5.1 Explain why the geologic time scale is used to show Earth's history.  
STA: S 7.4.b      BLM: knowledge  
36. ANS: F, Precambrian Time  
PTS: 1      DIF: L2  
OBJ: CaLS.8.5.2 Describe what early Precambrian organisms were like.  
STA: S 7.4.g      BLM: comprehension  
37. ANS: T      PTS: 1      DIF: L1  
OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.  
STA: S 7.4.g      BLM: knowledge  
38. ANS: T      PTS: 1      DIF: L2  
OBJ: CaLS.8.5.2 Describe what early Precambrian organisms were like.  
STA: S 7.4.e      BLM: comprehension  
39. ANS: F, moon

- PTS: 1 DIF: L2 OBJ: CaLS.8.3.3 State the probable age of Earth.  
STA: S 7.4.d BLM: comprehension  
40. ANS: F, Theory of plate tectonics
- PTS: 1 DIF: L2  
OBJ: CaLS.8.4.1 Use the theory of plate tectonics to explain the movement of Earth's landmasses.  
STA: S 7.4.f BLM: comprehension

## COMPLETION

41. ANS: rock cycle
- PTS: 1 DIF: L1 OBJ: CaLS.8.1.2 Describe the rock cycle.  
STA: S 7.4.c BLM: knowledge  
42. ANS: plates
- PTS: 1 DIF: L2 OBJ: CaLS.8.1.2 Describe the rock cycle.  
STA: S 7.4.c BLM: comprehension  
43. ANS: relative
- PTS: 1 DIF: L1 OBJ: CaLS.8.2.1 State the law of superposition.  
STA: S 7.4.c BLM: knowledge  
44. ANS: unconformity
- PTS: 1 DIF: L1  
OBJ: CaLS.8.2.2 Describe how geologists determine the relative age of rocks.  
STA: S 7.4.c BLM: knowledge  
45. ANS: index
- PTS: 1 DIF: L1  
OBJ: CaLS.8.2.3 Explain how index fossils are useful to geologists.  
STA: S 7.4.c BLM: knowledge  
46. ANS: radioactive
- PTS: 1 DIF: L2  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.  
STA: S 7.4.d BLM: comprehension  
47. ANS:  
half-life  
half life
- PTS: 1 DIF: L1  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.

- STA: S 7.4.d      BLM: knowledge
48. ANS:  
half-life  
half life
- PTS: 1      DIF: L2  
OBJ: CaLS.8.3.2 Describe what can be learned from radioactive dating.  
STA: S 7.4.d      BLM: comprehension
49. ANS:  
carbon-14  
carbon 14
- PTS: 1      DIF: L2  
OBJ: CaLS.8.3.2 Describe what can be learned from radioactive dating.  
STA: S 7.4.d      BLM: comprehension
50. ANS: 4.6 billion
- PTS: 1      DIF: L1      OBJ: CaLS.8.3.3 State the probable age of Earth.  
STA: S 7.4.d      BLM: knowledge
51. ANS: vertebrates
- PTS: 1      DIF: L1  
OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.  
STA: S 7.4.g      BLM: knowledge
52. ANS: continents
- PTS: 1      DIF: L2  
OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.  
STA: S 7.4.g      BLM: comprehension
53. ANS: Mesozoic
- PTS: 1      DIF: L1  
OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.  
STA: S 7.4.g      BLM: knowledge
54. ANS: 1.1 billion
- PTS: 1      DIF: L3      OBJ: CaLS.8.3.3 State the probable age of Earth.  
STA: S 7.4.d      BLM: synthesis
55. ANS: uniformitarianism
- PTS: 1      DIF: L3      OBJ: CaLS.8.1.1 Explain what uniformitarianism is.  
STA: S 7.4.b      BLM: synthesis
56. ANS: Carbon-14
- PTS: 1      DIF: L3

- OBJ: CaLS.8.3.2 Describe what can be learned from radioactive dating.  
STA: S 7.4.d BLM: synthesis  
57. ANS: uniformitarianism
- PTS: 1 DIF: L2 OBJ: CaLS.8.1.1 Explain what uniformitarianism is.  
STA: S 7.4.b BLM: comprehension  
58. ANS: index fossil
- PTS: 1 DIF: L2  
OBJ: CaLS.8.2.3 Explain how index fossils are useful to geologists.  
STA: S 7.4.d BLM: comprehension  
59. ANS: eras
- PTS: 1 DIF: L3  
OBJ: CaLS.8.5.1 Explain why the geologic time scale is used to show Earth's history.  
STA: S 7.4.g BLM: synthesis  
60. ANS: plate tectonics
- PTS: 1 DIF: L2  
OBJ: CaLS.8.4.2 Describe how the movement of Earth's plates has affected organisms.  
STA: S 7.4.f BLM: application

## SHORT ANSWER

61. ANS:  
B is older. According to the law of superposition, each layer of horizontal sedimentary rock is older than the layer above it. A is above B, therefore, B is older.
- PTS: 1 DIF: L2 OBJ: CaLS.8.2.1 State the law of superposition.  
STA: S 7.4.c BLM: application  
62. ANS:  
C, E, D
- PTS: 1 DIF: L2 OBJ: CaLS.8.2.1 State the law of superposition.  
STA: S 7.4.c BLM: application  
63. ANS:  
D is older than B; an unconformity
- PTS: 1 DIF: L2  
OBJ: CaLS.8.2.2 Describe how geologists determine the relative age of rocks.  
STA: S 7.4.c BLM: analysis  
64. ANS:  
The geologist could use radioactive dating to determine the absolute age of F; then by the law of superposition, A must be at least as old as F, which lies above A.

PTS: 1 DIF: L2  
OBJ: CaLS.8.2.2 Describe how geologists determine the relative age of rocks.  
STA: S 7.4.c BLM: application

65. ANS:

G is younger than C; intrusion

PTS: 1 DIF: L2  
OBJ: CaLS.8.2.2 Describe how geologists determine the relative age of rocks.  
STA: S 7.4.c BLM: application

66. ANS:

You would be much more likely to find fossils in layer C, the sedimentary rock. As an igneous rock, G formed from very hot, liquid magma that would destroy any fossils.

PTS: 1 DIF: L2  
OBJ: CaLS.8.2.2 Describe how geologists determine the relative age of rocks.  
STA: S 7.4.c BLM: application

67. ANS:

The half-life is 28 years, or the time it takes for one half (50%) of the original amount of strontium-90 to decay.

PTS: 1 DIF: L2  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.  
STA: S 7.4.d BLM: analysis

68. ANS:

56 years

PTS: 1 DIF: L2  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.  
STA: S 7.4.d BLM: analysis

69. ANS:

the "birth" of the rock, or when the magma or lava first hardened to become rock

PTS: 1 DIF: L2  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.  
STA: S 7.4.d BLM: application

70. ANS:

It will take more than 112 years.

PTS: 1 DIF: L2  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.  
STA: S 7.4.d BLM: analysis

71. ANS:

It decreases.

PTS: 1 DIF: L1  
OBJ: CaLS.8.3.1 Explain what happens during radioactive decay.

STA: S 7.4.d      BLM: analysis

72. ANS:

No. Fossils can be many thousands or millions of years old. Strontium-90's half-life is so short that the amount left undecayed in a fossil would be too small to measure accurately.

PTS: 1      DIF: L3

OBJ: CaLS.8.3.2 Describe what can be learned from radioactive dating.

STA: S 7.4.d      BLM: synthesis

## ESSAY

73. ANS:

This could happen because of the rock cycle, which changes one kind of rock into another. The sand grain could become compacted with other sediments and cemented to form a sedimentary rock. If the rock were attached to oceanic crust, then the rock could be subducted and melt to form magma. The magma could erupt from a volcano as lava.

PTS: 1      DIF: L3      OBJ: CaLS.8.1.2 Describe the rock cycle.

STA: S 7.4.c      BLM: synthesis

74. ANS:

The relative age of a rock layer is its age compared to that of another rock layer. The absolute age is the number of years ago that the rock layer formed.

PTS: 1      DIF: L2

OBJ: CaLS.8.2.2 Describe how geologists determine the relative age of rocks.

STA: S 7.4.c      BLM: analysis

75. ANS:

Index fossils are the remains of particular types of organisms that were widely distributed but lived during only one short period of time. The relative ages of rocks can be determined using index fossils. Rock layers containing the same type of index fossil can be assumed to be of similar age.

PTS: 1      DIF: L2

OBJ: CaLS.8.2.3 Explain how index fossils are useful to geologists.

STA: S 7.4.c      BLM: comprehension

76. ANS:

Since both plates are moving toward each other, the two plates will be 198 km apart when each plate has moved 1 km.  $Time = Distance / Speed = 1 \text{ km} / (5 \text{ cm/yr}) = 1,000 \text{ m} / (5 \text{ cm/yr}) = 100,000 \text{ cm} / (5 \text{ cm/yr}) = 20,000 \text{ yr}$ . The plates will be 198 km apart in 20,000 years.

PTS: 1      DIF: L2

OBJ: CaLS.8.4.2 Describe how the movement of Earth's plates has affected organisms.

STA: S 7.4.f      BLM: analysis

77. ANS:

The geologic time scale is a timeline of the life forms and geologic events in Earth's history. It is based on evidence from the fossil record. Since Earth has existed for billions of years, the geologic time scale is broken into units called eras and periods. These divisions of geologic time help to organize events in Earth's long history. Major events in the history of life mark the change from one period to the next.

PTS: 1 DIF: L2

OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras. |

CaLS.8.5.1 Explain why the geologic time scale is used to show Earth's history.

STA: S 7.4.g BLM: comprehension

78. ANS:

Early in the Paleozoic Era, invertebrates such as trilobites, clams, and insects were common. In the Mesozoic Era, reptiles such as dinosaurs were common. In the Cenozoic Era, mammals and flowering plants became common and are common today.

PTS: 1 DIF: L2

OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.

STA: S 7.4.g BLM: comprehension

79. ANS:

According to one theory, the impact on Earth's surface of a large asteroid from space caused the mass extinction at the end of the Cretaceous Period. The impact of the asteroid itself killed many organisms. It also sent a huge amount of dust and water vapor into the atmosphere. Dust and clouds blocked sunlight for years. The lack of sun killed plants. Plant-eating animals starved first, followed by the carnivores that preyed on the plant eaters.

PTS: 1 DIF: L2

OBJ: CaLS.8.5.3 Describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.

STA: S 7.4.g BLM: comprehension

80. ANS:

Plate tectonics drives the rock cycle. The movements of plates form volcanoes and build mountain ranges. As mountain ranges erode, deposition of sediments occurs. Rocks are metamorphosed through heat and pressure that are created by tectonic actions. All of these processes leave traces— for example, sedimentary deposition and fossilization— that allow geologists to read the history of the earth and determine a geologic timescale. Fossils also point to evolution. Evolution is influenced by the movements of plates away from or toward each other, for example the splitting of Pangaea or the Indian subcontinent merging with Asia. These movements separate populations, move populations through new climates as continents change latitude, and/or create new environments— the high ranges of the Himalaya, for example. All of these changes prompt evolution to occur.

PTS: 1 DIF: L3

OBJ: CaLS.8.4.2 Describe how the movement of Earth's plates has affected organisms.

STA: S 7.4.e | S 7.4.f | S 7.4.g BLM: evaluation