7. A
8. D
9. D
10. A
11. active tendon system
12. flexible pipe
13. cross brace
14. base isolator
15. A
16. C
17. C
18. B
19. B
20. D

Vocabulary and Section Summary

SECTION: WHAT ARE EARTHQUAKES?

1. seismology: the study of earthquakes
2. deformation: the bending, tilting, and breaking of the Earth's crust; the change in the shape of rock in response to stress
3. elastic rebound: the sudden return of elastically deformed rock to its undeformed shape
4. seismic wave: a wave of energy that travels through the Earth, away from an earthquake in all directions
5. P wave: a seismic wave that causes particles of rock to move in a back-and-forth direction
6. S wave: a seismic wave that causes particles of rock to move in a side-to-side direction

SECTION: EARTHQUAKE MEASUREMENT

1. seismograph: an instrument that records vibrations in the ground and determines the location and strength of an earthquake
2. seismogram: a tracing of earthquake motion that is created by a seismograph
3. epicenter: the point on Earth's surface directly above an earthquake's starting point, or focus
4. focus: the point along a fault at which the first motion of an earthquake occurs

SECTION: EARTHQUAKES AND SOCIETY

1. gap hypothesis: a hypothesis that is based on the idea that a major earthquake is more likely to occur along the part of an active fault where no earthquakes have occurred for a certain period of time
2. seismic gap: an area along a fault where relatively few earthquakes have occurred recently but where strong earthquakes have occurred in the past

Section Review

SECTION: WHAT ARE EARTHQUAKES?

1. Deformation
2. P waves
3. B
4. The majority of earthquakes occur near the edges of tectonic plate boundaries.
5. Earthquakes are caused by elastic rebound—the return of elastically deformed rock to its original state. When enough stress is applied to an elastically deformed rock, the rock along a fault slips and releases energy. Some of the energy travels as seismic waves, which cause an earthquake.
6. Sample answer: Convergent plate motion occurs where two plates are pushed together. It creates reverse faults. Divergent plate motion occurs where two plates pull away from each other. It creates normal faults. Transform motion occurs where two plates slip past each other. It creates strike-slip faults.
7. An earthquake zone is an area of Earth's crust where a large number of faults are located.
8. 480 km ÷ 8 km/s = 60 s = 1 min
9. Sample answer: Some earthquakes are stronger than others because a greater amount of energy is released when elastically deformed rock slips.
10. Sample answer: Surface waves are more destructive than P waves and S waves because surface waves produce ground motion in the upper few kilometers of the Earth's crust.

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11. Sample answer: At tectonic plate boundaries, different types of plate motion all cause faulting.

SECTION: EARTHQUAKE MEASUREMENT

1. Sample answer: An epicenter is the point on Earth's surface above the focus. A focus is the point along a fault where an earthquake starts.
2. A seismograph is the instrument used to record seismic waves. A seismogram is the tracing of earthquake motion created by a seismograph.
3. Earthquakes are detected by seismographs located at or near the Earth's surface.
4. Seismologists collect seismograms of an earthquake from at least three seismograph stations and place them on a time-distance graph. The distance of each station from the epicenter can then be found. These distances are used to draw circles around seismograph stations. The radius of each circle is the distance of the seismograph from the earthquake's epicenter. The point of intersection of these circles is the earthquake's epicenter.
5. Because the effects of an earthquake can vary from place to place, an earthquake can have more than one intensity value. Higher intensity values are more likely to be seen near the epicenter of an earthquake.
6. An earthquake of magnitude 7.0 will produce 1,000 times ($10 \times 10 \times 10$) more ground motion than an earthquake of magnitude 4.0.
7. An earthquake of magnitude 6.0 is much more destructive than an earthquake of 5.0 because an earthquake of magnitude 6.0 produces 10 times more ground motion.
8. Answers may vary. Sample answer: Intensity is a more important measure of earthquakes because the damage caused by an earthquake is something people can see.
9. Sample answer: A moderate earthquake might produce high intensity values near the epicenter of the earthquake.

SECTION: EARTHQUAKES AND SOCIETY

1. Sample answer: According to the gap hypothesis, strong earthquakes are likely to occur along sections of active faults that have had relatively few earthquakes. A seismic gap is an area along an active fault where relatively few earthquakes have occurred.
2. C
3. The earthquake hazard level of a particular area is determined by the amount of past and present seismic activity that has occurred in the area.
4. Sample answer: According to the strength and frequency method, earthquake strength is related to how often earthquakes occur. The gap hypothesis predicts an earthquake's strength and location by finding out the parts of an active fault where no earthquakes have recently occurred.
5. Sample answer: A common way of making a home more earthquake resistant is to securely fasten it to its foundation.
6. Answers may vary. Sample answer: Flexible pipes that are able to twist and bend during earthquakes prevent water and gas lines from breaking. A base isolator made of rubber and steel wrapped around lead absorbs seismic waves. A mass damper placed in the roof of a building counteracts the movement of the building during an earthquake. Cross braces placed between floors in a building counteract pressure that pushes and pulls at the side of a building.
7. Answers may vary. Sample answer: nonperishable food, a flashlight, a portable radio, a fire extinguisher, and a first-aid kit
8. $140 \div 420{,}000 \times 100 = .03\%$
9. The hypothesis is not incorrect because there was only a 20% probability an earthquake would fill the seismic gap.
10. Aftershocks follow a large earthquake because the earthquake causes elastically deformed rock along other nearby faults to break.

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