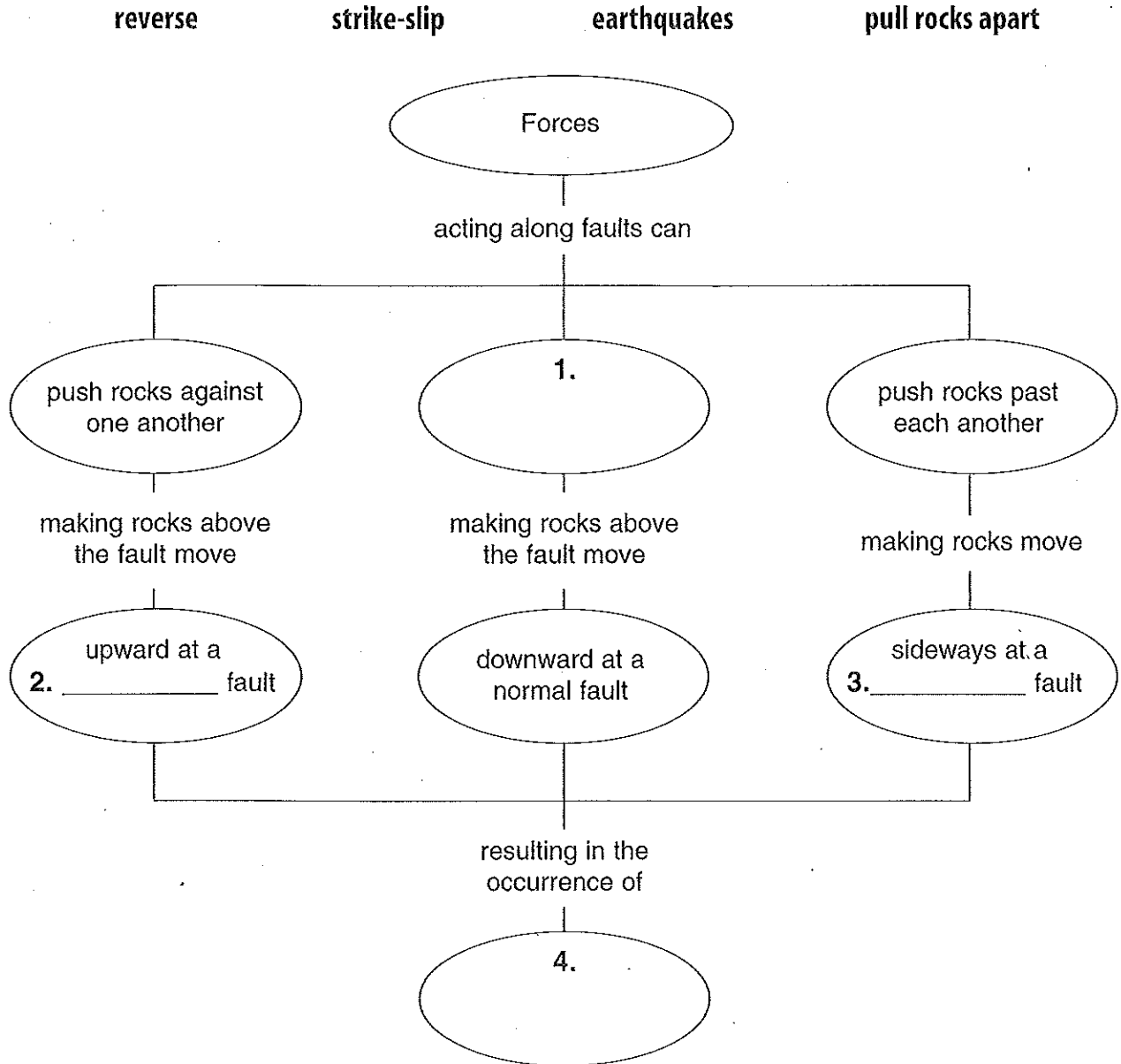



**Directed Reading for  
Content Mastery**
**Overview  
Earthquakes**

**Directions:** Complete the concept map using the terms in the list below.



**Directions:** Answer the following questions on the lines provided.

5. What kind of waves are responsible for all the damage an earthquake causes?

\_\_\_\_\_

6. The \_\_\_\_\_ scale is used to describe the strength of an earthquake.

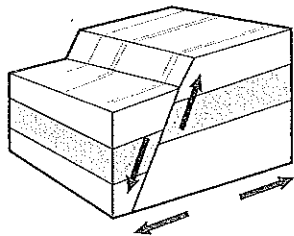
7. The \_\_\_\_\_ scale is used to describe the amount of damage an earthquake causes.


**Directed Reading for  
Content Mastery**
**Section 1 ■ Forces Inside Earth**

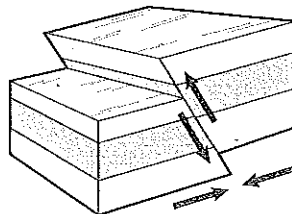
**Directions:** *Unscramble the terms in italics to complete the sentences below. Write the terms on the lines provided.*

- \_\_\_\_\_ 1. Forces cause sections of Earth's surface, called *petals*, to move.
- \_\_\_\_\_ 2. When rocks break, they move along surfaces called *stufla*.
- \_\_\_\_\_ 3. To relieve the *srests* caused by plate movement, rocks tend to bend, compress, or stretch.
- \_\_\_\_\_ 4. When rocks are stressed beyond their *staleci* limit they break, move along the fault, and return to their original shapes.
- \_\_\_\_\_ 5. An *akquethera* is the vibrations produced by the breaking of rock.
- \_\_\_\_\_ 6. At a *roamnl* fault, tension pulls rocks apart.
- \_\_\_\_\_ 7. At a *riskte-pils* fault, rocks move past each other.
- \_\_\_\_\_ 8. At a normal fault, rock above the fault surface moves *ddwwoanr* in relation to rock below the fault surface.
- \_\_\_\_\_ 9. At a *rreesv* fault, rocks above the fault surface move up and over the rocks below the fault surface.
- \_\_\_\_\_ 10. At a reverse fault, *mnopsericos* forces pushes on rocks from opposite directions.
- \_\_\_\_\_ 11. *earsh* forces can cause strike-slip faults.

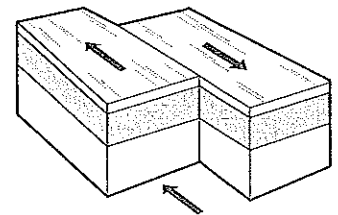
**Directions:** *Identify the faults shown below as reverse, normal, or strike-slip.*



12. \_\_\_\_\_



13. \_\_\_\_\_

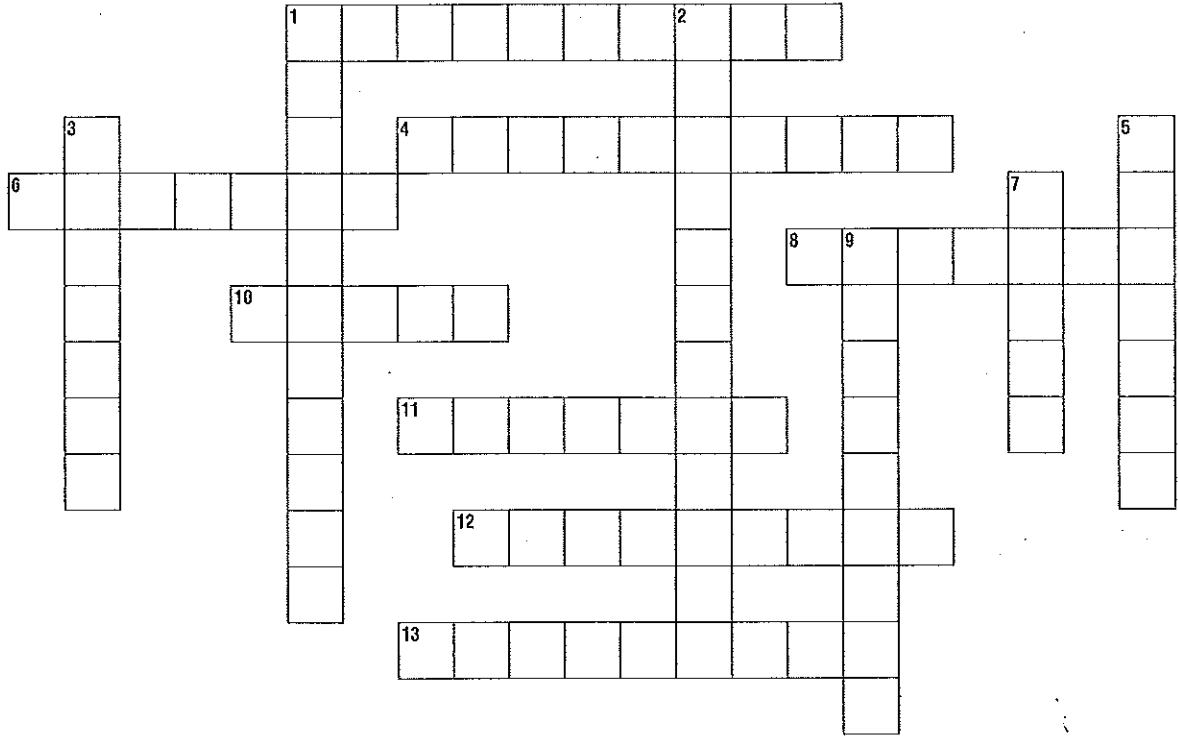


14. \_\_\_\_\_




**Directed Reading for  
Content Mastery**
**Key Terms  
Earthquakes**

**Directions:** Use the clues below to complete the crossword puzzle.



Meeting Individual Needs

**Across**

1. The rocks on either side of a \_\_\_\_\_ fault move sideways past each other.
4. Vibrations produced by the breaking of rock
6. The rocks above a \_\_\_\_\_ fault are forced up and over the rocks below the fault.
8. Ocean wave caused by an earthquake
10. The point where rocks break and release energy in the form of seismic waves
11. Wave that moves rock particles in a backward rolling motion and a side-to-side swaying motion
12. A measure of the energy released by an earthquake
13. The point on the surface of Earth directly above the earthquake's focus

**Down**

1. Instrument that measures seismic waves
2. When the soil becomes more liquid
3. The waves of energy that an earthquake produces
5. Kind of wave that causes particles in rocks to move back and forth in the same direction that the wave is traveling
7. The rocks on either side of a \_\_\_\_\_ move in different directions.
9. Kind of wave that causes particles in rocks to move at right angles to the direction of the wave



## Reinforcement

## Forces Inside Earth

**Directions:** Write the term that matches each description below on the spaces provided. Then rearrange the letters in the boxes to form a word for the force that creates reverse faults.

1. This is the name for the vibrations that rocks produce when they break.  \_\_\_\_\_
2. Earthquakes happen when these sections of Earth's crust move. \_\_\_\_\_
3. This force causes rocks on either side of a fault to slide past each other.  \_\_\_\_\_
4. Tension pulls rocks apart and creates this kind of fault. \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_
5. A bending and stretching rock will break when it reaches this point. \_\_\_\_\_  \_\_\_\_\_
6. Rocks on either side of this kind of fault move past each other without much upward or downward movement. \_\_\_\_\_  \_\_\_\_\_ - \_\_\_\_\_
7. Rocks above this kind of fault are forced up and over rocks below this fault. \_\_\_\_\_  \_\_\_\_\_
8. This force creates a normal fault. \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_
9. Force that creates reverse faults: \_\_\_\_\_

**Directions:** Find the mistakes in the statements below. Rewrite each statement correctly on the lines provided.

10. The surface of Earth is in constant motion because of forces on the planet's surface.  
 \_\_\_\_\_  
 \_\_\_\_\_
11. As rocks move past each other along a fault, their rough surfaces catch and permanently halt movement along the fault.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_


 SECTION  
3

## Reinforcement

## People and Earthquakes

**Directions:** *In the space provided, write R if the description refers to the Richter scale and M if it refers to the modified Mercalli scale.*

- \_\_\_\_\_ 1. based on the height of the lines traced by a seismograph
- \_\_\_\_\_ 2. describes the strength of an earthquake
- \_\_\_\_\_ 3. describes the amount of damage an earthquake causes
- \_\_\_\_\_ 4. an earthquake with an intensity of VII
- \_\_\_\_\_ 5. an earthquake with a magnitude of 8.5

**Directions:** *Write true if the statement is true. If the statement is false, rewrite the word or words in italics to make the statement true.*

- \_\_\_\_\_ 6. The paper record of a seismic event is called a *seismograph*.
- \_\_\_\_\_ 7. Far from shore, a large ship might ride over a seismic *sea wave* without anyone noticing it.
- \_\_\_\_\_ 8. A *seismogram* consists of a rotating drum of paper and a pendulum with an attached pen.
- \_\_\_\_\_ 9. An intensity-XII earthquake would cause *little* destruction.
- \_\_\_\_\_ 10. For safety's sake, people who live in earthquake regions *should* build their houses on loose soils.
- \_\_\_\_\_ 11. When liquefaction occurs, the soil becomes *more liquid* and buildings can sink into it and collapse.
- \_\_\_\_\_ 12. A seismic sea wave and a tsunami *are* the same thing.
- \_\_\_\_\_ 13. The water along a shoreline may flow *toward* the sea just before a tsunami crashes on shore.
- \_\_\_\_\_ 14. In some new buildings made of steel plates and rubber parts, the *steel* acts like a cushion to absorb earthquakes.
- \_\_\_\_\_ 15. One way to make your home earthquake-safe is to place heavy objects on *high* shelves so they won't fall on you.



## Note-taking Worksheet

# Earthquakes

## Section 1 Forces Inside Earth

- A. When rocks break they move along \_\_\_\_\_.
1. Applied forces cause rocks to undergo \_\_\_\_\_.
  2. When elastic \_\_\_\_\_ are passed, rocks break.
  3. Rock on one side of a fault can move \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_ in relation to rock on the other side of the fault.
- B. Faults occur because forces inside the Earth cause Earth's \_\_\_\_\_ to move placing stress on or near the plate edge.
1. Rocks will bend, compress, \_\_\_\_\_, and possibly break.
  2. \_\_\_\_\_—vibrations produced by breaking rock
    - a. Rocks break, move along the fault, return to original \_\_\_\_\_
    - b. Rock on one side of a fault can move over, under, or \_\_\_\_\_ each other along fault lines.
- C. Three types of \_\_\_\_\_ act on rocks – tension, compression, and shear.
1. Tension forces; \_\_\_\_\_ **fault**—caused by rock above the fault moving downward in relation to the rock below the fault
  2. \_\_\_\_\_ **fault**—compression forces squeeze rock above the fault up and over the rock below the fault.
  3. Created by shear forces; \_\_\_\_\_ **fault**—rocks on either side of the fault move past each other without much upward or downward motion.

## Section 2 Features of Earthquakes

- A. \_\_\_\_\_—waves generated by an earthquake can move the ground forward and backward, up and down, and side to side.
1. **Focus**—an earthquake's point of \_\_\_\_\_
  2. \_\_\_\_\_ waves (P-waves)—cause particles in rocks to move back and forth in the same direction that the wave is traveling
  3. \_\_\_\_\_ waves (S-waves)—cause particles in rock to move at right angles to the direction of wave travel
  4. \_\_\_\_\_ waves—move rock particles in a backward, rolling motion and a side-ways swaying motion
  5. The point on the Earth's surface directly above the earthquake focus is called the \_\_\_\_\_.

**Note-taking Worksheet (continued)**

B. The different \_\_\_\_\_ of seismic waves allow scientists to determine the epicenter.

1. \_\_\_\_\_ waves move fastest.
2. Secondary waves follow.
3. Surface waves move \_\_\_\_\_ and arrive at the seismograph station last.
4. \_\_\_\_\_—measures seismic waves
  - a. Consists of a rotating drum of paper and a pendulum with an attached \_\_\_\_\_.
  - b. The paper record of a seismic event is called a \_\_\_\_\_.

C. Earth's structure consists of an inner, mostly iron, solid core surrounded by a mostly iron liquid outer core surrounded by the mantle.

1. The crust is Earth's \_\_\_\_\_ layer, about 5 to 60 km thick.
2. A seismic wave's speed and direction change as the wave moves through different layers with \_\_\_\_\_.
  - a. Density generally \_\_\_\_\_ with depth as pressures increase.
  - b. \_\_\_\_\_ do not receive seismic waves because the waves are bent or stopped by materials of different density.
3. Changes in seismic wave \_\_\_\_\_ allowed detection of boundaries between Earth's layers.

**Section 3 People and Earthquakes**

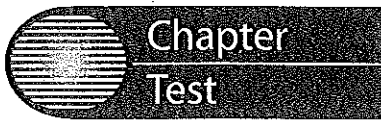
A. Although earthquakes are natural geologic events, they kill many people and cause a lot of \_\_\_\_\_.

1. \_\_\_\_\_—scientists who study earthquakes
2. **Magnitude**—measure of energy released by an earthquake; determined by the \_\_\_\_\_ and based on the height of the lines on a seismogram
  - a. The Richter scale has no \_\_\_\_\_ limit.
  - b. Most earthquakes have magnitudes too \_\_\_\_\_ to be felt by humans—3.0 to 4.9 on the Richter scale.
3. The modified \_\_\_\_\_ intensity scale describes earthquake intensity based on structural and geologic damage.
4. \_\_\_\_\_—shaking from an earthquake can make wet soil act like a liquid.



**Note-taking Worksheet (continued)**

5. Ocean waves caused by earthquakes are called \_\_\_\_\_.
- Caused when a sudden movement of the ocean floor \_\_\_\_\_ against the water
  - Can travel thousands of \_\_\_\_\_ in all directions
- B. Earthquakes cannot be reliably \_\_\_\_\_.
- Knowing how and where to \_\_\_\_\_ for earthquakes can help prevent death and damage.
  - Buildings can be \_\_\_\_\_ to withstand seismic vibrations.
    - Flexible, circular \_\_\_\_\_ are being placed under buildings; made of alternating layers of rubber and steel.
    - The rubber acts like a cushion to absorb earthquake waves.
  - Homes can be protected by careful placement of heavy objects and securing \_\_\_\_\_ appliances.
  - During an earthquake, crawl under a sturdy table or desk; outdoors, stay away from \_\_\_\_\_ and power lines.
  - After an earthquake, check for water or gas line damage; leave \_\_\_\_\_ if a gas smell is present.



# Earthquakes

## I. Testing Concepts

**Directions:** Circle the word or phrase in parentheses that best completes each statement.

1. The buildup of stress in Earth's crust can become so great that rocks reach their (elastic limit, tectonic force), and an earthquake occurs.
2. A reverse fault is often located where plates (come together, move apart).
3. (Primary waves, Secondary waves) move through Earth by causing particles in rocks to vibrate at right angles to the direction of the waves.
4. To locate an earthquake's (epicenter, elastic limit), scientist use information from at least three seismograph stations.
5. By noting the change in the speed and path of (seismic waves, the Moho discontinuity), scientists have been able to determine the structure of Earth's interior.
6. Seismologists use the (seismograph, Richter scale) to describe the magnitude of earthquakes.
7. One way to make your home more seismic-safe is to put heavy items on (upper, lower) shelves.
8. The San Andreas Fault in California is an example of a (normal, strike-slip) fault.
9. Most of the destruction during an earthquake is caused by (surface, primary) waves.
10. The radius of the circle seismologists draw on a map is equal to the distance from a station to an earthquake's (epicenter, fault line).
11. An earthquake with a (vibration, magnitude) of 6.5 releases about 30 times as much energy as an earthquake that registers 5.5 on the Richter scale.
12. (Primary waves, Secondary waves) don't pass through liquid so they are stopped when they hit the liquid outer core.
13. Shaking from an earthquake can cause wet soil to be more (solid, liquid).
14. The slowest seismic waves are (secondary waves, surface waves).
15. Primary waves arrive at a seismograph station (first, second).
16. When rocks break because of stress, the energy released is in the form of a(n) (earthquake, tsunami).
17. The boundary between the upper mantle and the crust is called the (Moho, Gutenberg) discontinuity.

**Chapter Test (continued)**

18. The area where no seismic waves are detected after they are released by an earthquake is called the (shadow zone, asthenosphere).
19. The outermost layer of Earth is the (asthenosphere, lithosphere).
20. The farther apart primary, secondary, and surface waves arrive, the (closer, farther away) the epicenter is.
21. (Primary waves, Secondary waves) move through Earth, causing particles in rocks to move back and forth in the same direction as the waves.
22. Normal faults are created by (compression, tension).
23. Rocks are subject to the force of tension where Earth's plates (come together, move apart).
24. (Compression, Tension) forces are present where Earth's plates come together.
25. At a (strike-slip, reverse) fault, the rocks above the fault surface are forced up and over the rocks below the fault surface.

**II. Understanding Concepts****Skill: Using Tables**

**Directions:** Use the information at the right to complete the table on the thickness of Earth's layers. Then answer the questions on the lines provided. You can use the space below the table for your calculations.

Structure		Thickness (km)
Crust	Crust	1.
Mantle	Lithosphere	65 km
	Asthenosphere	600 km
	Solid Mantle	2.
Core	Liquid outer core	3.
	Solid inner core	1,480 km

core = 3,470 km thick  
 mantle = 2,865 km thick  
 Earth's radius = 6,370 km

4. Which layer has a thickness of 1,480 km? \_\_\_\_\_
5. Which is thicker, the liquid outer core or the solid inner core? \_\_\_\_\_
6. Which is thicker, the crust or the solid mantle? By how much?  
 \_\_\_\_\_