

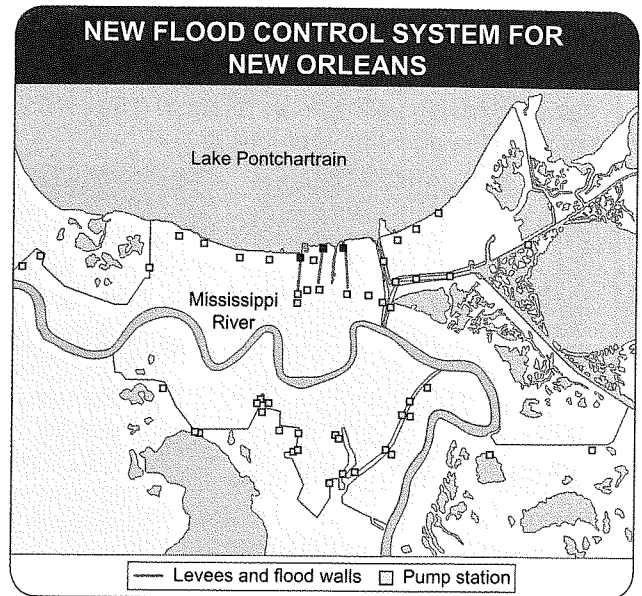
★ Spotlighted Item: **SHORT ANSWER**

DIRECTIONS: Read the passage, and study the map. Then read the question, and write your response on the lines. This task may take approximately 10 minutes to complete.

AFTER KATRINA

Hurricane Katrina struck New Orleans in August 2005, destroying thousands of homes and leaving most of the city under water. A storm surge pushed water up interior canals. It caused flood walls to fail and allowed water to pour into the city's lowest neighborhoods, which sit in a basin as much as 17 feet below sea level.

Each year, 30 square kilometers (12 square miles) of wetlands between New Orleans and the Gulf of Mexico are lost due to subsidence. These wetlands absorb some of the force of storm surges from the Gulf, protecting New Orleans. As they disappear, the city is more vulnerable to storms. A new system of flood protection was erected in and around New Orleans in the years after Katrina. It is meant to protect the city from other storms like Katrina. Such storms have been rare in the past but could be more frequent in the future due to climate change and the warming of tropical waters where they develop.



2. In the aftermath of Katrina, many owners of destroyed businesses have had to decide whether to rebuild in New Orleans or go elsewhere. Consider the information in the passage and map. Then explain why rebuilding in New Orleans might present problems for businesses, and evaluate whether the solution engineers have devised will be effective.

DIRECTIONS: Read the passage and question, and choose the **best** answer.

VOLCANO MONITORING

Volcanoes can erupt violently, with flows of red-hot lava, clouds of scorching steam, showers of rock and ash, and debris flows that can sweep away anything in front of them. Volcanic eruptions also kill many people.

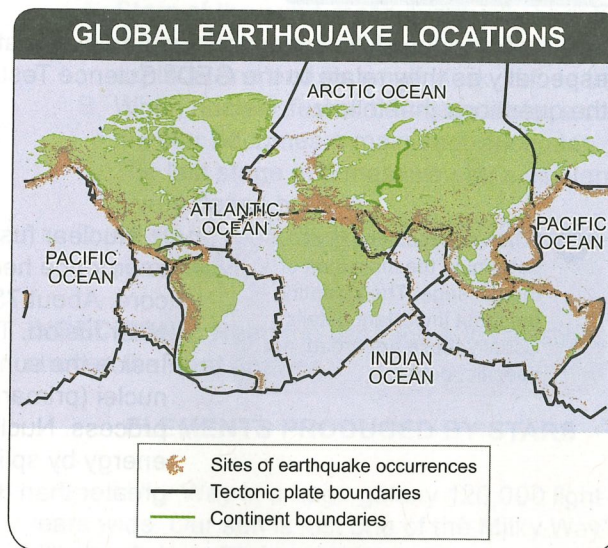
To save lives, volcanologists have developed tools to identify volcanic activity that could mean an eruption will occur soon. Instruments are placed on volcanoes to detect changes in their slopes because magma moving inside a volcano can cause it to swell before an eruption. In addition, seismographs record more earthquake activity as the magma inside a volcano moves. Scientists also monitor gases escaping from volcanoes, looking for those that are most likely to signal a coming eruption.

10. What is the **main** problem that volcano monitoring helps solve?
- A. the need to stop volcanoes from erupting
 - B. the need to have early warnings of eruptions
 - C. the need to reduce the number of volcanic eruptions
 - D. the need to understand how volcanic eruptions happen

DIRECTIONS: Study the information and map, read each question, and choose the **best** answer.

PLATE TECTONIC THEORY AND EARTHQUAKES

The theory of plate tectonics not only explains how many of Earth's features formed but also sheds light on many geologic processes, such as volcanic eruptions and earthquakes. The map below shows the locations of earthquakes around the world.



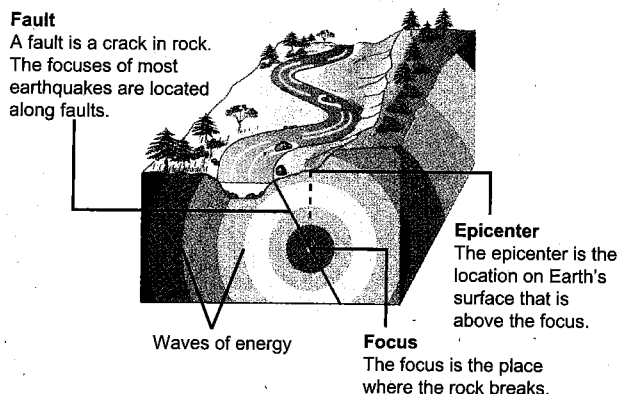
11. Which hypothesis is **best** supported by the information on the map?
- A. Earthquakes happen only at the edges of continents, not the interiors.
 - B. The boundaries of continents represent plate boundaries.
 - C. Earthquakes are most dangerous in the Pacific Ocean.
 - D. Earthquakes are most common at plate boundaries.
12. What part of the plate tectonic theory do the locations of earthquakes **most clearly** support?
- A. Effects of plate movement are significant at plate boundaries.
 - B. Earth's surface is composed of plates.
 - C. Plates contain continents but not oceans.
 - D. Plates are composed of solid rock.

3 Master the Skill

DIRECTIONS: Study the information and diagram, read each question, and choose the **best** answer.

EARTHQUAKES

An earthquake happens when rock beneath Earth's surface breaks suddenly. This movement produces waves of energy that travel away from the break. The shaking we think of as an earthquake occurs when the waves reach Earth's surface. The diagram below shows how an earthquake occurs along a fault.

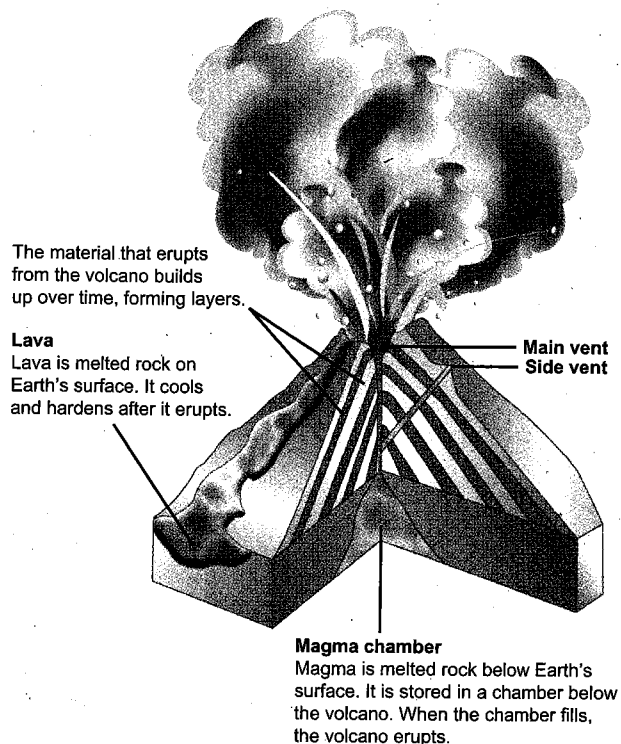


3. Which statement describes the locations of the epicenter and the focus of an earthquake?
 - A. Both are on Earth's surface.
 - B. The epicenter lies below the fault, and the focus lies above the fault.
 - C. Both lie directly on the fault.
 - D. The focus is directly below the epicenter.
4. Based on the passage and diagram, how do waves produced by a break in rock travel?
 - A. They travel outward from the focus.
 - B. They travel along the fault until they reach the surface.
 - C. They travel from the epicenter to the fault.
 - D. They travel inward from the surface.

DIRECTIONS: Study the information and diagram, read each question, and choose the **best** answer.

VOLCANOES

A volcano is a vent in Earth's surface that allows melted rock, or magma, from beneath the surface to escape. Most volcanoes also release gases and ash and eject rock fragments, or pyroclastics.



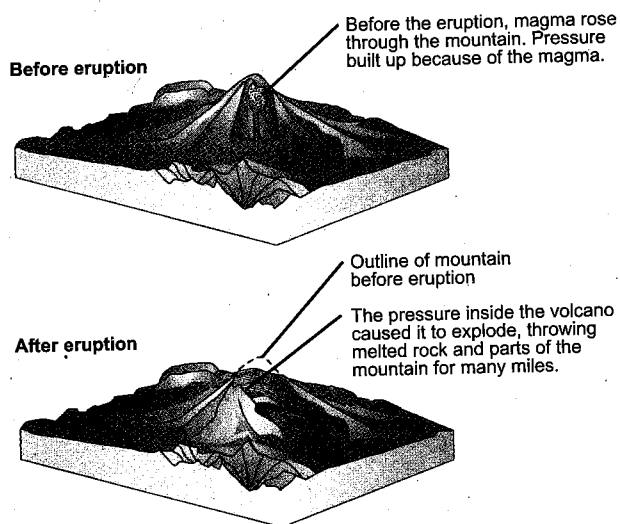
5. Based on the passage and diagram, what materials make up the layers of a volcano?
 - A. ash, rock fragments, and cooled lava
 - B. various gases
 - C. rock fragments
 - D. magma and cooled gas
6. Which description of volcanoes is supported by the passage and diagram?
 - A. Lava always erupts from the center of a volcano.
 - B. Most volcanoes erupt continuously.
 - C. Most volcanoes are small when they first form.
 - D. Volcanoes cannot erupt ash and lava at the same time.

3 Master the Skill

DIRECTIONS: Study the information and diagram, read each question, and choose the **best** answer.

MOUNT ST. HELENS

Mount St. Helens is a large volcano in the state of Washington. Mount St. Helens was inactive for many years. Then in 1980, it erupted. The diagram shows the structure of Mount St. Helens before and after it erupted. Although there have been no major eruptions at Mount St. Helens since the 1980s, there have been periods of activity, when the volcano has emitted smoke and ash.

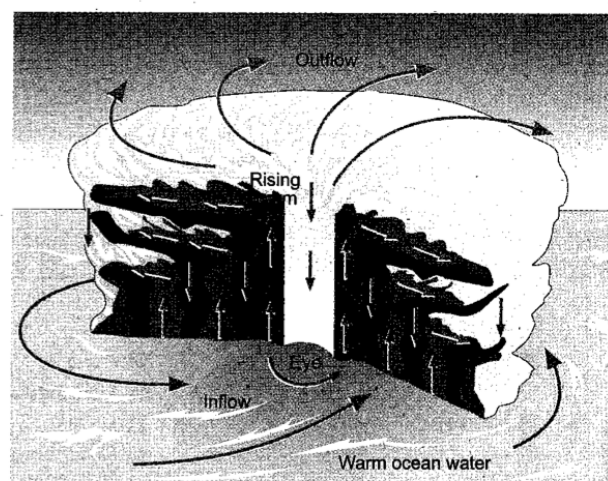


7. Based on the diagram, how did the eruption in 1980 change Mount St. Helens?
 - A. It made the volcano narrower.
 - B. It made the volcano shorter.
 - C. It completely destroyed the volcano.
 - D. It made the volcano larger.
8. What was flung into the air when Mount St. Helens erupted?
 - A. only rock from below the surface
 - B. a mixture of rock from below the surface and rock from the mountain
 - C. only gas from near the surface
 - D. mostly crushed rock from inside the magma chamber

DIRECTIONS: Study the information and diagram, read each question, and choose the **best** answer.

FORMATION OF A HURRICANE

Hurricanes form over warm tropical ocean waters where surface temperature is at least 82 degrees Fahrenheit. The heat of the ocean is transferred to the atmosphere, providing the energy that builds up huge banks of clouds around a low pressure area, or a low. As the low intensifies and the system begins to spin, a hurricane can develop. Hurricanes can maintain their strength and even grow as long as they remain over warm ocean waters. But as they travel away from the tropics, they move over cooler waters and often land. As they do, they lose their source of energy and break up.



8. Based on the concept of heat transfer and the information, how is energy transferred between the ocean surface and the air right above it?
 - A. by radiation
 - B. by convection
 - C. by saturation
 - D. by conduction
9. In hurricanes, the warm air rises, cools, and then sinks to be warmed again. What is this type of heat transfer called?
 - A. convection
 - B. condensation
 - C. radiation
 - D. conduction
10. Which concept does the formation of hurricanes demonstrate?
 - A. The prevailing winds in the middle latitudes blow from the west in the northern hemisphere.
 - B. The density of ocean water increases with salinity.
 - C. As air warms, it becomes less dense than the cooler air around it and rises.
 - D. Energy can be neither created nor destroyed.

3 Master the Skill

DIRECTIONS: Study the information and images, read each question, and choose the **best** answer.

HURRICANE SANDY

When Hurricane Sandy hit the Atlantic coast in October 2012, it struck as a Category 1 storm, the weakest type of hurricane. But because it hit a densely populated area, it caused devastating damage, as shown by the airborne lidar images below. Sandy flooded communities and wrecked thousands of homes and businesses, some of which were swept out to sea. After Sandy, many people started to rebuild homes or businesses. But some people question the wisdom of this tactic. With climate change, storms like Sandy are expected to become more frequent. So homes built in the same low, vulnerable areas likely will be destroyed again.

Before Sandy

After Sandy



Credit: U.S. Geological Survey

3. What solution might make it more likely for homes, offices, and factories to withstand future storms on the coast?
 - A. Build barrier walls, and raise structures above flood-line levels.
 - B. Construct much larger buildings so that winds cannot knock them down.
 - C. Construct more bridges so that people can escape in time to avoid danger.
 - D. Build structures farther apart from one another so that the area is less densely populated.

4. Some people think low-lying areas along the shore should be abandoned. Based on the information presented, why do they believe the solution is to avoid rebuilding in such areas?

- A. Houses are very expensive in shore areas.
- B. In the future, most hurricanes will hit the Atlantic coast of the United States.
- C. Storms likely will hit the areas struck by Sandy and destroy the homes again.
- D. No home can ever withstand a hurricane at the shore.

DIRECTIONS: Study the information and list, read each question, and choose the **best** answer.

EMERGENCY KITS

A hurricane emergency kit solves one big problem. It provides hurricane victims with supplies that will be needed if they have no water and electricity after a storm. The Federal Emergency Management Agency suggests that all people in hurricane-prone areas have emergency kits. Such a kit should include the items listed below.

HURRICANE EMERGENCY KIT

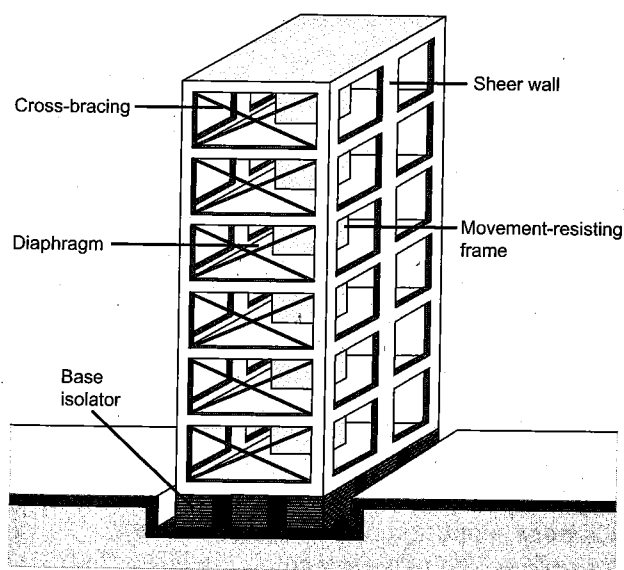
- ✓ Nonperishable food and medicines:
 - Protein bars, nuts, dry cereal, dried fruit, peanut butter
 - Vitamins and medications used by family members
- ✓ Bottled water
 - One gallon of water per day per person for three days
- ✓ Battery-powered radio and batteries
- ✓ First-aid kit
- ✓ Paper cups and plates
- ✓ Moist towelettes and garbage bags
- ✓ Matches
- ✓ Pet food
- ✓ Cell phone with charger

5. What is the purpose of a hurricane emergency kit?
 - A. to help people exit an area when a hurricane occurs
 - B. to provide information about what to do when a hurricane is approaching
 - C. to provide supplies that may be needed in the aftermath of a hurricane
 - D. to ensure that people have food and water when a hurricane occurs
6. Which item missing from the list of kit supplies would be **most** useful?
 - A. fresh milk
 - B. pots and pans
 - C. electric blankets
 - D. a flashlight

DIRECTIONS: Study the information and illustration, read the question, and choose the **best** answer.

EARTHQUAKE-RESISTANT BUILDINGS

Many deaths and injuries caused by earthquakes result from buildings and other structures collapsing. For this reason, engineers have tried to design structures that can resist the forces that cause structures to collapse. The most damaging waves traveling from an earthquake's focus are those that cause buildings to shake from side to side. This motion creates stress on connections that link walls, floors, and beams. Earthquake-resistant design strengthens those connections. Floors and roofs are connected to diaphragms for horizontal strength. Sheer walls and cross-bracing strengthen vertical elements. Some design features allow structures to bend and sway instead of breaking. Movement-resisting frames have connections between beams that allow beams to bend, not snap. Base isolation places buildings on materials that deflect a quake's energy rather than transmit it through the structure.



11. How does earthquake-resistant design solve a problem?
- A. It keeps earthquakes from happening in an area.
 - B. It lowers construction costs.
 - C. It reduces the likelihood of the destruction of buildings.
 - D. It ensures that buildings constructed after earthquakes occur are more attractive.

DIRECTIONS: Study the information and table, read each question, and choose the **best** answer.

TORNADO ALERTS

A tornado is a rotating column of air that extends from the clouds of a severe thunderstorm to the ground. Tornadoes have some of the most violent winds of any storm—up to 300 miles per hour. The powerful winds of a tornado can spread destruction over an area many miles wide. Also, twisters are responsible for dozens of deaths in the United States each year. For these reasons, knowing where and when tornadoes are about to form is important.

The National Weather Service has devised a system of watches and warnings to alert people when several types of severe weather are approaching or occurring in an area. The information for tornadoes is presented in the table.

Tornado Watch	Tornado Warning
The conditions are right for tornadoes in your area. Keep alert for an approaching storm.	A tornado is in your area. It has been sighted or spotted on weather radar. Take cover where you can.

12. What problem caused the National Weather Service to create tornado watches and warnings?
- A. Scientists needed a better understanding of how tornadoes form.
 - B. People wanted help getting services after tornadoes.
 - C. People needed to find out when tornadoes are nearby.
 - D. Scientists wanted to help weather forecasters track tornadoes more easily.
13. What should a store owner do before tornado season to prepare?
- A. Buy a book on tornadoes to loan to employees.
 - B. Make sure employees know where to go if a tornado warning is issued.
 - C. Plan to close the shop whenever there is a severe thunderstorm.
 - D. Get the number of the National Weather Service to call for details when a watch or warning is issued.