

Continental Drift, Plate Tectonics, Earthquakes and Volcanoes Study Guide

Answer Sheet

- Define the following vocabulary: lithosphere, asthenosphere, fault, tectonic plate, Pangaea, earthquake, seismic wave
 - Lithosphere- part of the Earth made of the crust and the top part of the mantle
 - Asthenosphere- part of the mantle that moves around due to the convection currents
 - Fault- a crack in the lithosphere where rocks move past each other
 - Tectonic plate- the lithosphere is broken into large pieces, and each of the large pieces is called a tectonic plate
 - Pangaea- the name given to the supercontinent that is believed to have existed millions of years ago
 - Earthquake- Shaking of the ground caused by a release of stress and the sudden movement of large blocks of rock along a fault
- What does the Theory of Continental Drift say?
 - The continents were once all joined together in a supercontinent called Pangaea, and drifted to their current positions over millions of years.
- What evidence did Alfred Wegener offer to support his theory of Continental Drift?
 - A map of the continents fit together like a jigsaw puzzle
 - Land features- Mountain ranges and coal fields were found on separate continents that lined up perfectly
 - Fossils- fossils of the exact same kinds of plants were found on different continents; fossils of animals that could not swim far were found on continents that were separated by oceans
 - Climate Change- Fossils of tropical plants were found in the Arctic region, where they could never survive today; evidence of glaciers can be found in mountains in South Africa
- Why didn't most scientists believe Alfred Wegener's Theory of Continental Drift when he first proposed it?
 - He couldn't explain how the continents moved.
- What does the Theory of Plate Tectonics say?
 - The Earth's lithosphere is broken down into large pieces called tectonic plates, and those tectonic plates are constantly moving very slowly, because of the convection currents in the asthenosphere.
- What makes the tectonic plates move?
 - Convection currents in the asthenosphere move the tectonic plates in the lithosphere.
- Describe the 3 types of plate boundaries, and the movement that occurs at each one.
 - Convergent boundary- 2 tectonic plates moving toward each other
 - Divergent boundary- 2 tectonic plates moving away from each other
 - Transform boundary- 2 tectonic plates slipping past each other in opposite directions
- What land features or events are formed at each type of plate boundary?
 - Convergent boundaries- Mountains, Trenches, Volcanoes, Earthquakes
 - Divergent boundaries- Rift Valleys, Mid-ocean ridges, Volcanoes, earthquakes
 - Transform Boundaries- Earthquakes
- What is a mid-ocean ridge and how does it form?
 - A mountain range at the floor of the ocean, that surrounds a fault, and it is where new oceanic crust is formed. It forms at a divergent boundary under the ocean from sea-floor spreading.
- Describe what sea-floor spreading is and how it occurs
 - Sea-floor spreading is the formation of new oceanic crust on both sides of a mid-ocean ridge. As the tectonic plates pull apart at the divergent boundary, magma rises up through the fault and cools, forming new crust. As the new crust is formed, it pushes the older crust further away from the fault, like a conveyor belt.
- Name the three types of evidence we studied that supports sea-floor spreading.
 - Rock samples from oceanic crust showed that newer crust was found closer to the mid-ocean ridge and older crust was found further away from the mid-ocean ridge
 - The oceanic crust at the mid-ocean ridge has matching stripes of rocks with alternating magnetic poles, on each side of the fault.
 - Rocks were found on the ocean floor that had to have been formed when molten material cools.
- What is subduction? Where does it occur and why?
 - Subduction is when one tectonic plate slides under another tectonic plate. During subduction, crust is destroyed and recycled back into the mantle. It occurs at convergent boundaries and occurs because the 2 tectonic plates have different densities. The more dense plate slides underneath the less dense plate. Oceanic crust is more dense than continental crust. Older oceanic crust is more dense than newer oceanic crust.
- What role does subduction play in changing the size and shape of oceans?
 - If more crust is being subducted than is being formed at a mid-ocean ridge, the ocean will shrink. If more crust is being formed at a mid-ocean ridge than is being subducted, then the ocean will grow.
- Name the 3 types of stresses that act on rocks, and describe which type of boundary they occur at.
 - Compression is a stress that squeezes rocks together and happens at a convergent boundary
 - Tension is a stress that pulls rocks apart and happens at a divergent boundary
 - Shearing is a stress that makes rocks slide past each other in opposite directions, and happens at a transform boundary
- Name and 3 types of faults we discussed in class.
 - Normal fault
 - Reverse fault
 - Strike-slip fault
- How are plate boundaries and stresses related?
 - Stresses are the forces that make tectonic plates move in the direction they do, at plate boundaries

17. How are stresses and faults related?
- Stresses are the forces that create the 3 types of faults
18. How do earthquakes happen?
- As the tectonic plates move, pieces get stuck together, and energy builds up until final enough stress causes the plates to break free. When that happens, vibrations occur that travel through the Earth carrying the energy that was released when the plates broke free.
19. What is the difference between the focus and epicenter of an earthquake?
- The focus is the point beneath Earth's surface where rock breaks under stress and causes an earthquake. The epicenter is the point on Earth's surface, directly above the focus.
20. Which type of seismic wave causes the most damage?
- Surface waves
21. Where do most earthquakes occur?
- At tectonic plate boundaries
22. What does the Richter scale measure?
- Earthquake strength or magnitude, based on the size of an earthquake's seismic waves
23. What does the Mercalli scale measure?
- the level of damage done by an earthquake at a certain location
24. What is a volcano and how does it erupt?
- An opening in Earth's crust where molten rock, rock fragments, and hot gases erupt. Eruptions occur when carbon dioxide and other gases are trapped in magma, under pressure. As the magma rises to the surface, the pressure decreases, and the gases begin to expand. The force of the expanding gases pushes the magma out of the volcano.
25. Name and describe the main parts of a volcano.
- Magma Chamber-a pocket below the volcano where magma collects
 - Pipe-a long tube in the ground that connects the magma chamber to Earth's surface
 - Vent-an opening in the volcano where magma and gases exit
 - Crater-crater is a bowl-shaped area that may form at the top of the volcano around the central vent (a caldera is actually a more accurate name for this area.)
26. What is the difference between magma and lava?
- Magma, which is a molten mixture of rock, gases and water, is found underground. Lava is magma that has reached Earth's surface
27. Where do most volcanoes occur?
- At tectonic plate boundaries
28. What is the Ring of Fire?
- A large region of volcanoes that rim the Pacific Ocean.
29. What is a hot spot volcano?
- A volcano that forms over a "hot spot." A "hot spot" is an area where material from deep within the mantle rises and melts, forming magma. The Hawaiian Islands formed one by one over millions of years as the Pacific Plate drifted over a "hot spot."

30. What is the difference between an active, dormant, and extinct volcano?

Active-is erupting or has shown signs that it will erupt in the near future

Dormant-scientists expect that it will awaken at some time in the future and erupt

Extinct-volcano is unlikely to erupt again

31. What is a pyroclastic flow?

A mixture of super hot gases and rock fragments that race down the volcano.

32. Name and describe the 3 most common types of volcanoes

- a. Shield volcano- huge, gently sloping volcanoes built of very thin lava spreading out in all directions from a central vent. They have wide bases several miles in diameter with steeper middle slopes and a flatter summit. The gentle slopes give them an outline like a medieval knight's shield. Eruptions of these volcanoes are not usually explosive, but are more like liquid overflowing around the edges of a container.



- b. Cinder Cone- the most common type of volcano and the simplest type of volcano. They are built from particles and blobs of lava ejected from a single vent. As the gas-charged lava is blown violently into the air, it breaks into small fragments that solidify and fall as *cinders* around the vent to form a circular . Most cinder cones have a bowl-shaped *crater* at the summit and rarely rise more than a thousand feet or so above their surroundings.



- c. Composite Volcano - are also known as stratovolcanoes because they are built of layers of alternating lava flow, ash and blocks of unmelted stone. They are larger than cinder cones, rising up to 8,000 feet. Stratovolcanoes form from a conduit system of vents leading from a magma reservoir beneath the surface. When dormant, they typically have steep sides and a relatively small crater. They are considered the most violent type of volcano

