Continental Drift, Plate Tectonics, Earthquakes and Volcanoes Study Guide Answer Sheet

1. Define the following vocabulary: lithosphere, asthenosphere, fault, tectonic plate, Pangaea, earthquake
   1. Lithosphere- part of the Earth made of the crust and the top part of the mantle
   2. Asthenosphere- part of the mantle that moves around due to the convection currents
   3. Fault- a crack in the lithosphere where rocks move past each other
   4. Tectonic plate- the lithosphere is broken into large pieces, and each of the large pieces is called a tectonic plate
   5. Pangaea- the name given to the supercontinent that is believed to have existed millions of years ago
   6. Earthquake- Shaking of the ground caused by a release of stress and the sudden movement of large blocks of rock along a fault
2. What does the Theory of Continental Drift say?
   1. The continents were once all joined together in a supercontinent called Pangaea, and drifted to their current positions over millions of years.
3. What evidence did Alfred Wegener offer to support his theory of Continental Drift?
   1. A map of the continents fit together fit together like a jigsaw puzzle
   2. Land features-Mountain ranges and coal fields were found on separate continents that lined up perfectly
   3. 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
   4. 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
4. What evidence did exploration of the ocean floor reveal to further support Wegener's theory?
   1. New crust was being at mid-ocean ridges-the newer crust was closer to the mid-ocean ridge and the older crust was farther away from it
   2. There were strips of ocean floor with alternating magnetic poles
   3. Rocks were found on the ocean floor that had to have been formed when molten material cools.
5. Why didn’t most scientists believe Alfred Wegener’s Theory of Continental Drift when he first proposed it?
   1. He couldn’t explain how the continents moved.
6. What are tectonic plates?
   1. The large pieces of the lithosphere that are broken and move over the asthenosphere
7. What does the Theory of Plate Tectonics say?
   1. 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.
8. What makes the tectonic plates move?
   1. Convection currents in the asthenosphere move the tectonic plates in the lithosphere.
9. Describe the 3 types of plate boundaries, and the movement that occurs at each one.
   1. Convergent boundary- 2 tectonic plates moving toward each other
   2. Divergent boundary- 2 tectonic plates moving away from each other
   3. Transform boundary- 2 tectonic plates slipping past each other in opposite directions
10. What land features or events are formed at each type of plate boundary?
    1. Convergent boundaries- Mountains, Trenches, Volcanoes, Earthquakes
    2. Divergent boundaries- Rift Valleys, Mid-ocean ridges, Volcanoes, earthquakes
    3. Transform Boundaries- Earthquakes
11. What does tectonic plates folding on each other cause?
    1. Fold mountains
12. What is a mid-ocean ridge and how does it form?
    1. 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. .
13. Describe what sea-floor spreading is and how it occurs
    1. 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.
14. Name the three types of evidence we studied that supports sea-floor spreading.
    1. 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
    2. The oceanic crust at the mid-ocean ridge has matching stripes of rocks with alternating magnetic poles, on each side of the fault.
    3. Rocks were found on the ocean floor that had to have been formed when molten material cools.
15. What is subduction?  Where does it occur and why?
    1. 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.
16. What role does subduction play in changing the size and shape of oceans?
    1. 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.
17. Name the 3 types of stresses that act on rocks and describe which type of boundary they occur at.
    1. Compression is a stress that squeezes rocks together and happens at a convergent boundary
    2. Tension is a stress that pulls rocks apart and happens at a divergent boundary
    3. Shearing is a stress that makes rocks slide past each other in opposite directions, and happens at a transform boundary
18. What is a fault?
    1. Cracks in the lithosphere where plates move toward, away from, or past each other
19. What is the difference between a hanging wall and a foot wall?
    1. In a normal fault, the block of rock that lies above the fault is the hanging wall. The rock that sits below the fault is the foot wall.
20. Name and describe the 3 types of faults we discussed in class.
    1. Normal fault- the hanging wall slides down below the foot wall.
    2. Reverse fault- the hanging wall slides up above the foot.
    3. Strike-slip fault- the rocks on each side of the fault slide horizontally past each other with little up or down motion
21. How are plate boundaries and stresses related?
    1. Stresses are the forces that make tectonic plates move in the direction they do, at plate boundaries
22. How are stresses and faults related?
    1. Stresses are the forces that create the 3 types of faults
23. How can plate tectonics affect the size of oceans?
    1. If the amount of new oceanic crust that is being formed (sea floor spreading) is greater than the amount of old oceanic crust that is being recycled (subduction), then that ocean will grow. If the amount of new oceanic crust that is being formed is less than the amount of old oceanic crust that is being recycled, then that ocean will shrink
24. Define the following vocabulary: earthquake, seismic wave
    1. Earthquake- shaking of the ground caused by the sudden movement of large blocks of rock along a fault
    2. Seismic wave-energy from earthquakes which travel in waves. They start as vibrations.
25. How do earthquakes happen?
    1. 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.
26. What is the difference between the focus and epicenter of an earthquake?
    1. 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.
27. Compare and contrast P waves, S waves, and L Waves.
    1. They are all seismic waves
    2. P waves, or primary waves, are the fastest and arrive first at the epicenter. They can travel through solids, liquids and gases. They are push-pull waves
    3. S waves, or Secondary waves are the second type of wave to arrive after an earthquake. They can travel through solids but CANNOT travel through liquids or gases. They move in an up-down motion.
    4. L waves, or Surface waves, do not move through Earth’s interior; they move along Earth’s surface. They make the ground roll up and down or shake from side to side. They cause the largest ground movements and the most damage.
28. Where do most earthquakes occur?
    1. At tectonic plate boundaries
29. What is the difference between a seismograph and a seismogram?
    1. Seismogram is a written or digital record of an earthquake
    2. Seismograph is an instrument that records earthquakes
30. What does the Richter scale measure?
    1. Earthquake’s size, based on the size of the Earthquake’s seismic waves
31. What does the Mercalli scale measure?
    1. Earthquake’s strength, based on the amount of damage the earthquake caused
32. When geologists study rock layers, the younger rock is usually layered above the older rock. What might explain why a geologist might find an area where older rock is above the younger rock?
    1. The layers of rock might have been folded after they were originally formed
33. What is a volcano and how does it erupt?
    1. 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
34. How are earthquakes and volcanoes related?
    1. They both usually occur at a plate boundary and they both occur as a result of tectonic plate movement.
35. Name and describe the main parts of a volcano.
    1. Magma Chamber-a pocket below the volcano where magma collects
    2. Pipe-a long tube in the ground that connects the magma chamber to Earth’s surface
    3. Vent-an opening in the volcano where magma and gases exit
    4. 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.)
36. Name and describe the 3 main types of volcanoes?
    1. Shield volcano- broad, flat dome volcano built by many eruptions of lava that is low in silica and flows easily
    2. Cinder Cone – steep, cone-shaped volcano built of pieces of magma that harden in the air then fall to the ground
    3. Composite Volcano-cone shaped volcano built of high-silica magma. The tall cone is make of layers of lava and layers of rock fragments.
37. What is the difference between magma and lava?
    1. Magma, which is a molten mixture of rock, gases and water, is found underground and lava is magma that has reached Earth’s surface
38. Where do most volcanoes occur?
    1. At tectonic plate boundaries
39. What is the Ring of Fire?
    1. A large region of volcanoes that rim the Pacific Ocean.
40. What is a hot spot volcano?
    1. 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.”
41. What is the difference between an active, dormant, and extinct volcano?
    1. Active-is erupting or has shown signs that it will erupt in the near future
    2. Dormant-scientists expect that it will awaken at some time in the future and erupt
    3. Extinct-volcano is unlikely to erupt again
42. What is a pyroclastic flow?
    1. A mixture of super hot gases and rock fragments that race down the volcano.