

## Plate Tectonics, Earthquakes, and Volcanoes Study Guide

You should know the difference between focus and epicenter. **Focus INSIDE Earth, Epicenter OUTSIDE**

You will also need to name the steps to the scientific method.

**Fat Hippos Munch Potato Chips**

**Focus Question    Hypothesis    Materials    Procedure    Conclusion**

### **Variables:**

**Independent** – this is what you change. (weight of paper, design of raft)

**Dependent** - this is what is affected by your change. (distance the plane flew, how many pennies the raft held)

**Control** – these are the things that you keep the same. ( size of paper, force of throw, foil, straws)

### **Boundaries:**

**Convergent** – come together

**Divergent** – different directions

**Transform** – slip and slide past each other

### **Types of volcanoes:**

**Dormant** – asleep but could erupt again

**Extinct** – will never erupt again

**Active** – still erupting

**Lava Dome**- volcanoes built by slow eruptions and sometimes formed with a crater

**Cinder Cone** - volcanoes that have a bowl shape at the summit

**Shield** – volcanoes that have broad, sloping sides and are built from lava

**Composite** – volcanoes formed by alternating layers of lava and rock fragments

**Continental Drift** – earliest theory that states that the continents are moving apart to different locations.

**Plate Tectonics** – states that the earth is broken into plates which float on the asthenosphere.

## Plate Tectonics, Earthquakes, and Volcanoes Study Guide

1. **Volcano** – an opening or crack in the earth's surface through which lava flows.
2. **Transform boundary** – plates that slip and slide past one another.
3. **Focus**- the point underground where the earthquake starts.
4. **Plate tectonics** – the theory that explains how landforms are made such as islands, mountains, valleys, etc.
5. **Shield Volcanoes** – volcanoes that have broad, sloping sides and are built from lava.
6. **Ring of Fire** – the circle of volcanoes that circle the Pacific Plate.
7. **Epicenter** – the point directly above the focus. This point is above the ground.
8. **Extinct volcanoes** – volcanoes that will never erupt again.
9. **Magma**- hot melted rock deep inside the earth.

1. **Lava** – magma that reaches the earth surface.
2. **Lava Dome Volcanoes**- volcanoes built by slow eruptions and sometimes formed with a crater.
3. **Composite Volcanoes**- volcanoes formed by alternating layers of lava and rock fragments.
4. **Earthquake** – the trembling and/or shaking of the ground.
5. **Active volcanoes** – volcanoes that still erupt.
6. **Continental Drift** – the earliest theory that states that the continents are moving apart into different locations on the earth.
7. **Seismograph** – the instrument used to measure the strength of earthquakes.
8. **Divergent boundary** – plates that move in Different Directions and pull apart.

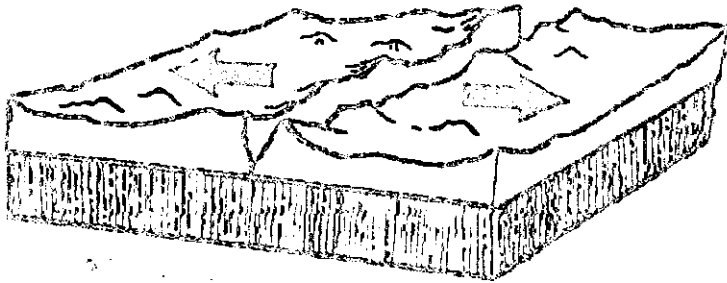
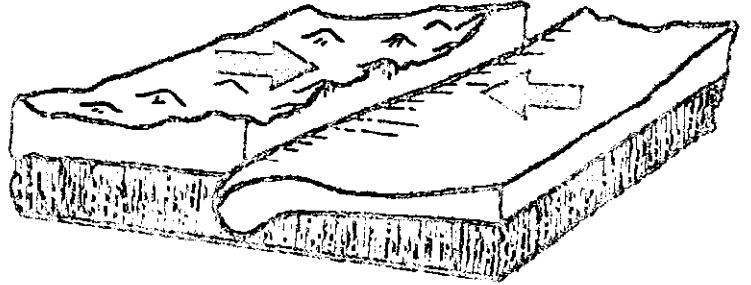
1. **Volcanoes that are said to be asleep, but still have the possibility of erupting are dormant volcanoes.**
2. **Divergent, convergent and transform are types of plate boundaries.**
3. **The theory of plate tectonics states that the earth is broken into pieces which float on the asthenosphere.**
4. **Small earthquakes are called tremors.**
5. **Alfred Wegener developed the theory of continental drift.**
6. **Plates that Crash and Come together are Convergent.**
7. **Volcanoes which have a bowl shaped crater at the summit are Cinder Cone Volcanoes.**
8. **Sea Floor spreading is the process in which the ocean floor is extended when two plates move apart.**

You will have to be able to label the 4 layers of the earth. Crust, Mantle, Outer Core, Inner Core

You will have to know the difference between magma and lava. Magma INSIDE Earth, Lava OUTSIDE.

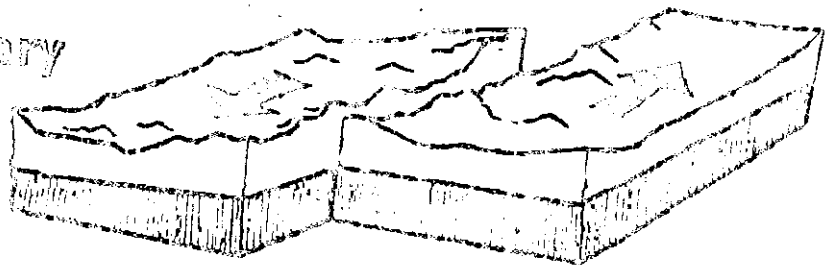
# Study Prints

Convergent Boundary



Divergent Boundary

Transform Boundary



## Changes to the Earth's Surface Study Guide

- **Plate**: Rigid block of crust and upper-mantle rock; the plates float on the soft rock of the upper mantle
  - **Magma**: Molten rock from the Earth's mantle
  - **Volcano**: Opening in the Earth's crust through which lava flows; mountains formed by lava and ash
  - **Earthquake**: Shaking of the ground from energy released in the Earth's crust
  - **Fault**: A break or place where pieces of the Earth's crust move
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- **Continental Drift**: Theory of how the continents move over the Earth's surface
  - **Pangaea**: "Supercontinent" on Earth that existed millions of years ago
  - **Fossils**: Remains or traces of past life found in the Earth's crust

### Plate Boundaries: Mountains, Volcanoes, and Earthquakes

- Many of the Earth's highest mountains are formed where the continental plates collide and push together. This is an example of a Convergent Boundary, the Himalayas are an example.
- Sometimes mountains form when a large chunk of rock pushes above the Earth's crust from the mantle. An example of these mountains are the Grand Tetons in Wyoming.
- Chains of volcanoes form at a trench formed where a continental plate and an oceanic plate collide. This causes the oceanic plate, which is thinner and more dense, to go underneath, or be subducted below, the continental plate. This is also an example of a Convergent Boundary, Mount St. Helens formed this way.
- Sometimes volcanoes form in the middle of plates, over unusually hot columns of magma. The magma melts a hole in the plate and rises through the hole, causing a volcanic eruption. The Hawaiian Islands formed like this in the middle of the Pacific Plate.
- Many volcanoes are located at plate boundaries around the Pacific plate; this area is called the Ring of Fire.
- When continental plates slide past each other they form a Transform Boundary. This is the same type of movement taking place along the San Andreas Fault in California. The land is under stress where the two plates are sliding past each other. When this stress builds and releases its energy, an earthquake occurs.
- The last type of plate movement is a Divergent Boundary. Most Divergent Boundaries are located on oceanic crust. Oceanic crust is floating on the asthenosphere, which has currents like water. When two oceanic plates begin to pull apart, magma comes to the surface. This is an example of a Divergent Boundary.

- 1. Write a detailed description of the earth's internal structure. Include all of the following terms in your description: crust, mantle, core (inner and outer), lithosphere, asthenosphere, plates. Include the physical state of various regions. Moving from the surface of the earth toward the center the first layer is the thin solid crust. Just beneath the crust is the solid outer portion of the mantle which is also relatively thin. Together the crust and the solid outer layer of the mantle make up the lithosphere. Next is the molten portion of the mantle referred to as the asthenosphere. The remaining deeper portion of the mantle is solid. As a whole, the mantle is the largest layer of the earth's structure. Beneath the mantle is the outer core which is liquid. At the center of the earth is the solid inner core.**
- 2. Explain plate tectonics and continental drift.**

Plate tectonics is the model which describes the earth's lithosphere as divided into sections (plates) which "float" on the molten asthenosphere, slowly moving over long periods of time. Since the continents are parts of the plates, they too move, hence the term continental drift.
- 3. Provide two possible explanations for how plates move.**

One theory is that large convection cells in the asthenosphere act as conveyor belts to move the plates. Another theory suggests that subduction of a plate pulls the rest of the plate along. A third theory suggests that rising molten material along spreading ridges causes the plates to slide "downhill". It may turn out to be a combination of all of these or even something else.
- 4. Define each of the following: constructive plate margins, destructive plate margins, subduction, mid-ocean ridge, convection cell.**
  - **Constructive plate margins** are divergent plate boundaries. Here the magma from the asthenosphere rises between the plates as they move apart, cools and creates new lithosphere.
  - **Destructive plate margins** are convergent plate boundaries. Here the lithosphere of one plate is forced under another plate and destroyed, or pushed upward to form mountains.
  - **Subduction** occurs when one plate slides beneath another along a convergent boundary. The subducting plate is consumed by the asthenosphere.
  - **Mid ocean ridges** are the result of a divergent plate boundary. As the plates move apart. The magma rises from the asthenosphere and cools, building the ridge.
  - **Convection cells** occur in the molten material of the asthenosphere. Hot, molten material rises and moves along the bottom of the lithosphere. It moves downward when it cools and cycles back to complete the cell. These convection cells may be a mechanism for moving tectonic plates.

**5. Describe three types of plate boundaries.**

- **Divergent boundaries** occur where two adjacent plates are moving apart. This is where new lithosphere is built. These spreading centers are often seen as mid-ocean ridges.
- **Convergent boundaries** occur where two plates collide. It is along these boundaries that lithosphere is destroyed and recycled into the asthenosphere as one plate slides under the other (subduction). Mountains are also built along such boundaries as lithosphere on the two plates is pushed upward.
- **Transform or sliding boundaries** occur where plates slide by each other.

**6. Explain why earthquakes and volcanoes are prominent along plate boundaries.**

Earthquakes occur as the plates converge or slide by each other. Tension builds up over time because of friction. When the plates finally slip the earth trembles. Volcanoes result where molten magma from the asthenosphere breaks through the lithosphere. This can occur most easily along plate margins where the lithosphere is broken.

**7. What are mantle plumes and how are they related to volcanoes?**

Mantle plumes are where the magma from the asthenosphere is very hot and moves upward melting the lithosphere above. When the magma breaks through, a volcano may result.

**8. Explain how plate tectonics can lead to the development of new species.**

The movement of the plates leads to separation and isolation of populations of one species. As the plates drift and environmental conditions change the separated groups develop into different species through natural selection.

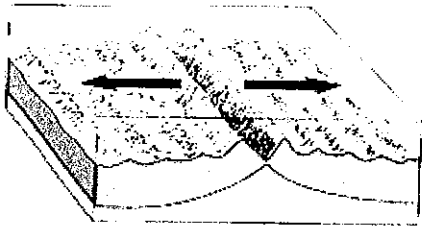
## Volcanoes:

- Define what a volcano is.
- Explain the difference between magma and lava.
- Describe where most volcanoes are found.
- Describe what the “Ring of Fire” is.
- Explain how volcanic activity can result from two oceanic plates converging, an oceanic and continental plate converging, and/or at divergent boundaries.
- Define what a hot spot is.
- Explain how the Hawaiian Islands formed.
- Define what viscosity is and how viscosity of magma leads to different eruptions.
- Define what pyroclastic material is and differentiate between the types of pyroclastic material.
- Define a crater.
- Describe the three types of volcanoes (Shield, Composite, and Cinder Cone).
- Define what a caldera is.
- Describe the dangers of volcanoes to society (not on hwk).
- Describe how earthquakes can help predict volcanoes (not on hwk).

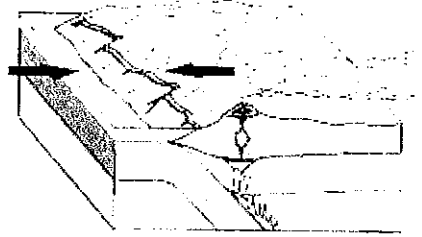
Name \_\_\_\_\_

## Plate Tectonics Worksheet

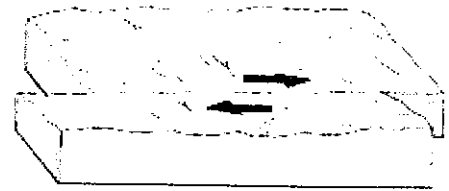
Label each figure by writing the type of plate boundary it shows.



1. \_\_\_\_\_



2. \_\_\_\_\_



3. \_\_\_\_\_

4. In your own words, state the theory of plate tectonics?

5. Describe what happens when two plates carrying oceanic crust collide.

6. Describe what happens when two plates carrying continental crust collide

7. Describe what happens when a plate carrying oceanic crust collides with a plate carrying continental crust.

8. Explain what force caused the movement of the continents from one supercontinent to their present positions.

9. A scientific \_\_\_\_\_ is a well-tested concept that explains a wide range of observations.

10. Breaks in Earth's crust where rocks have slipped past each other are called \_\_\_\_\_.

11. The lithosphere is broken into separate sections called \_\_\_\_\_.

12. A(n) \_\_\_\_\_ is a deep valley on land that forms along a divergent boundary.

13. The geological theory that states that pieces of Earth's crust are in constant, slow motion is called \_\_\_\_\_.