

NOTES: Theory of Plate Tectonics

Name _____

DIRECTIONS: As you learn about the *Theory of Plate Tectonics* from the slide presentation, fill in the blanks or *circle* the correct choice in parentheses. Add your own **notes** or **diagrams** to help you remember the concepts.

See Earth Science Reference Tables, page 10.

1. Topic: EARTH'S INTERIOR

NOTES:

- What is the temperature at Earth's inner core? _____
- Earth's outer core is [*liquid, solid*] because the actual temperature is [*less than, greater than*] the melting point of the rock material.

2. Topic: _____

NOTES:

- The temperature in the asthenosphere is slightly [*less than, greater than*] the melting point of the rock material which makes up the asthenosphere. This causes [*partial, total*] melting of the mantle.
- Continental crust is [*thinner, thicker*] and [*less, more*] dense than oceanic crust.

3. Topic: _____

NOTES:

- Convection currents are located in the [*asthenosphere, lithosphere*].
- Heat causes matter to [*expand, contract*], making it [*less, more*] dense. In this way, heat is transferred from Earth interior to the surface.
- Rising arrows [*diverge, converge*] in the upper part of the asthenosphere.

See Earth Science Reference Tables, page 5.

4. Topic: _____

NOTES:

- Write the names of the major **mid-ocean ridges** found at divergent boundaries.
 1. _____
 2. _____
 3. _____
 4. _____
 5. _____
- Arrows at these plate boundaries show that the plates are [*converging, diverging*].

Next slide:

- Rift valleys [do, do not] have equal and constant activity all along the rift.
- Rift valleys, and hence, divergent boundaries are broken by _____ faults.

Next slide:

TRANSFORM BOUNDARIES

NOTES:

- Transform plate boundaries occur where tectonic plates [*are pulled apart, slide past each other*].

Next slide:

- The lithospheric plate on the western side of the San Andreas Fault is moving [*SE, NW*], while the lithospheric plate on the eastern side of the San Andreas Fault is moving [*SE, NW*].
- The San Andreas Fault forms a [*divergent, transform*] plate boundary.

5. Topic: _____

NOTES:

- Find the Peru-Chile Trench to the west of South America. The Andes Mountains in western South America have formed from volcanic eruptions along this [*convergent, divergent*] boundary.

The Cascade Mountains, including Mt. St. Helens which erupted in 1980, are found in the northwest region of the United States where the Juan de Fuca Plate is [*subducting under, overriding*] the North American Plate.

Next slide:

6. Topic: _____

NOTES:

At the Aleutian Trench, the Pacific Plate is the [*overriding, subducting*] plate.

- At the Tonga Trench, the Pacific Plate is the [*overriding, subducting*] plate. So older, more dense rock makes up the edge of the [*Indian-Australian, Pacific*] Plate.

Next slide:

- Describe a collision boundary. _____

Next slide:

- Locate India and the Eurasian Plate. The Indian-Australian Plate is the [*subducting, overriding*] plate.
- The Appalachian mountains formed by [*collision, subduction*].

Next slide:

- The Himalaya Mtns. are located at the boundary between the _____ and _____ Plates.

NOTES:

Next slide:

WORLD MAP – TECTONIC PLATE BOUNDARIES

Fill in the chart below with the three types of tectonic plate boundaries shown in the map, their locations on this map, and other locations from pg. 5 in your *Earth Science Reference Tables*.

<i>Type of plate boundary</i>	<i>Location on the map</i>	<i>Other locations from Reference Tables, pg.5</i>

Next slide:

EVIDENCE:

1. Deeper earthquakes are evidence for the existence of a [*convergent, divergent*] plate boundary.
2. On South America’s west coast, earthquakes that occur farther inland are [*deeper, shallower*] than earthquakes that occur in the ocean. This [*is, is not*] consistent with a subduction zone.

Next slide:

3. Earthquakes that occur in Japan have deeper foci the farther [*east, west*] that they occur, which is typical for a subducting plate.

Next slide:

4. The locations of earthquakes and volcanoes surround the entire [*Atlantic, Pacific*] ocean. This is known as the “Ring of Fire”.

Next slide:

5. Figure #1 shows that volcanoes form [*on land, in the ocean*] when an ocean plate [*subducts, overrides*].
6. Figure #2 shows the formation of a [*mid-ocean ridge, deep ocean trench*] and island arc. The island arc is formed from [*volcanoes, earthquakes, both of these*].

Next slide:

7. Undersea mountain ranges [*are, are not*] consistent with the locations of mid-ocean ridges formed at [*convergent, divergent*] plate boundaries.

Next slide:

8. Mountains on land are usually formed at [*convergent, divergent*] plate boundaries.

Next slide:

9. Rocks that form at spreading centers have [*normal, reverse*] polarity.
10. Bands of rock at equal distances on opposite sides of a spreading have [*different, the same*] polarity and have [*different, the same*] ages.

Next slide:

11. Name the four other hot spots shown on the map on pg. 5 of your *Earth Science Reference Tables*.

12. Hot spots usually [*do, do not*] occur at plate boundaries.

13. The youngest of the Hawaiian Islands is [*Hawaii, Kauai*].

Next slide:

14. Tectonic forces [*do, do not*] contribute to the formation of Earth’s rocks.
15. State the two types of rock that are formed as a direct result of tectonic plate interactions.
_____ and _____

Next slide:

16. The Pacific Plate is **forming** in mid-ocean ridges at the [*eastern and southern edges, western and northern edges*] and being **destroyed** in subduction zones at the [*eastern and southern edges, western and northern edges*].

17. We can infer that the Atlantic Ocean is becoming [*narrower, wider*] since at the Mid-Atlantic Ridge, new sea floor is being [*destroyed, formed*].
18. Most of the tectonic plates [*are, are not*] named for the large land masses which sit upon them.

NOTES:

QUIZ: Record your answers here. Then click to the *next slide* for the **KEY**.
Check your answers and record your score here. **SCORE** _____

- | | |
|----|-----|
| 1. | 6. |
| 2. | 7. |
| 3. | 8. |
| 4. | 9. |
| 5. | 10. |

RELATED WEBSITES: See animations and review Plate Tectonics concepts:

- http://vulcan.wr.usgs.gov/Glossary/PlateTectonics/description_plate_tectonics.html
- <http://scign.jpl.nasa.gov/learn/plate.htm>
- <http://pubs.usgs.gov/publications/text/understanding.html>
- <http://kids.earth.nasa.gov/archive/pangaea/>
- <http://geology.er.usgs.gov/eastern/tectonic.html>
- <http://observe.arc.nasa.gov/nasa/earth/tectonics/Tectonics1.html>

NYS Physical Setting / Earth Science Core Curriculum

Read and study...

- **Standard 2, Key Idea 1-- *Information technology is used to retrieve, process, and communicate information as a tool to enhance learning.***
- **Standard 4, Key Idea 2 -- *Many of the phenomenon that we observe on Earth involve interactions among components of air, water, and land.***
 - ***Earth's internal heat engine is powered by heat from the decay of radioactive materials and residual heat from Earth's formation. Differences in density resulting from heat flow within Earth's interior caused the changes explained by the theory of plate tectonics: movement of the lithospheric plates; earthquakes; volcanoes; and the deformation and metamorphism of rocks during the formation of young mountains.***
 - **Major Understandings: 2.1 a, b, k, l, m, n**
 - The outward transfer of Earth's internal heat drives convective circulation in the mantle that moves the lithospheric plates comprising Earth's surface.
 - The lithosphere consists of separate plates that ride on the more fluid asthenosphere and move slowly in relationship to one another, creating convergent, divergent, and transform plate boundaries.
 - Many processes of the rock cycle are consequences of plate dynamics.
 - Many of Earth's surface features are a consequence of forces associated with plate motion and interaction.
- **Standard 6, Key Idea 1, 2, 5 -- *Process skills: systems thinking; models; patterns of change.***