**TABLE COPY ROOM 817**

**TEACHER LECTURE NOTES**

**CHAPTER 4** – The Hypothesis of Continental Drift, The Hypothesis of Seafloor Spreading, and The Theory of Plate Tectonics

A. Review from 4.1

1) Recall from 4.1 that we learned about CONTINENTAL DRIFT and SEAFLOOR SPREADING. Both of these fall into the category of scientific hypotheses.

2) CONTINENTAL DRIFT – We give credit to Wegener for proposing this hypothesis and it states this: **the continents once formed a single landmass (Pangaea), broke up, and drifted to their present locations.**

3) SEAFLOOR SPREADING – We give credit to Hess for stating the ideas of this hypothesis *and* to Dietz for naming this hypothesis. It states this: **there is movement of the ocean floor away from either side of the mid-ocean ridge.**

4) These two hypotheses led to the formulation of a more far-reaching scientific theory called **PLATE TECTONICS**.

B. The Theory of Plate Tectonics – Section 4.2

1) Why it has “theory status”

- because it not only describes continental movement, but ALSO proposes an explanation of WHY AND HOW continents move.

2) Officially, the Theory of Plate Tectonics states the following:

**- theory that the lithosphere is made up of tectonic plates that float on the asthenosphere and that the plates possibly are moved by convection currents occurring deep within the earth**

3) Information about TECTONIC PLATES

a. Most lithospheric plates are composed of BOTH continental and oceanic crust.

\* What do I have to support this statement? Answer: picture on bottom of page 72.

b. To date, about 30 lithospheric plates have been identified.

c. The plates are in motion. Some are moving toward each other, some are moving apart, and some are sliding past each other. This constant motion has created the earth’s major SURFACE features, such as MOUNTAIN RANGES and DEEP-OCEAN TRENCHES.

\* Did you see the red arrows on the bottom of page 72? Also, how many plates do they show (it’ s not all 30 of them)?

TEACHER QUESTION TIME – it is now time for some Q&A about the picture. Miss W. will call on students.

4) Information about PLATE BOUNDARIES

There are three types of plate boundaries, each of which is associated with a characteristic type of geologic activity.

***Boundary 1***: DIVERGENT BOUNDARY

Definition: a boundary formed between two plates that are moving AWAY from one another

Three things about it:

1 – As the plates move apart, melted material from the asthenosphere rises up into the gap and creates new oceanic crust

2 – Most divergent boundaries are found on the ocean floor and correspond directly to the places where these divergent boundaries are separating.

3 – The RIFT VALLEY is a deep valley found right at the center of a divergent boundary. Examples are the center of mid-ocean ridges and the space occupied by the Red Sea (formed by the separation of the African Plate from the Arabian Plate.

***Boundary 2***: CONVERGENT BOUNDARY

Definition: a boundary formed when there is a direct collision of one plate into another

Three types of COLLISIONS occur at this type of boundary:

1 – SUBDUCTION. Oceanic crust is colliding with continental crust and the oceanic crust gets shoved downward beneath the continental crust because the OCEANIC CRUST IS DENSER.

2 – MOUNTAIN BUILDING. Two continental crusts collide. One is not denser than the other, so their edges meet and crumple upward, producing large mountain ranges, such as the Himalayas.

3 – THE ISLAND ARC FORMATION. Two oceanic crusts collide. They both meet and have a competition of “who is going to get subducted.” When one gets subducted, mantle rock melts forming magma. The magma rises to the surface to form a CHAIN of volcanic islands called the ISLAND ARC. (Why a chain of many islands? Who can answer?)

(Now: OAA Booklet Problem)

***Boundary 3***: TRANSFORM BOUNDARY

Definition: a boundary formed where two plates are grinding PAST each other

How it works: The plate edges usually do not slide past along smoothly. Instead, they scrape together and move in a series of sudden spurts of activity separated by periods of little or no motion.

An example: The San Andreas Fault in California

5) The CAUSE of Plate Tectonics

The proposed cause of plate tectonics is **convection currents in the molten mantle.**

How it works:

1. Convection is the transfer of heat through a material. In this case, the material is magma in the mantle.
2. Magma deep in the mantle is intensely heated, so it RISES toward the crust. This is because when you heat something, its density is decreased and it tends to rise.
3. Once it has come up to the crust, it cools down and SINKS back down toward the mantle. This is because when something is cooled down, its density is increased and it tends to sink.
4. This results in constant cycling up and down of the molten magma. The molten magma keeps circulating up and down in circular convection currents.
5. Since the lithospheric plates are bound to the underlying moving mantle, their positions are constantly being shifted by the power supplied by the convection current – causing them to collide, separate, or slide past one another at their boundaries.

The science behind how it occurs in the earth & how it causes plate movements:

Youtube videos: gtvnetwork channel & terencedoran channel