Passing Plates II - Who's Fault?

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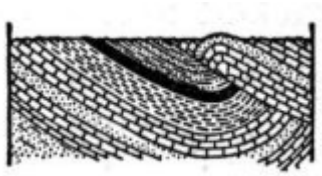

[1] In *Passing Plates I*, we took a trip back through history to see where the plate tectonic theory was born. Let's journey deeper into the earth to learn about these plates. Most of the plate "action" occurs within the **lithosphere**, which includes the **crust** and upper **mantle**. The crust is the solid outermost layer of the earth, and the mantle is the layer under the crust where the plate movement occurs. All of this makes the lithosphere one restless place. The places where the plates meet in the lithosphere are called **plate boundaries**. Earthquakes usually occur in plate boundaries. There are three types of plate boundaries: **divergent**, **convergent**, and **transform**.

[2] Divergent boundaries or "spreading zones" are found where two plates are moving away from each other. Most divergent boundaries are found in oceans where seafloor spreading occurs. The ocean floor has mid-ocean ridges and underwater mountain chains. In the centers of these mid-ocean ridges lie underwater volcanoes and other "hot spots." These hot spots are areas where magma rises from the **asthenosphere**. This rising mantle is referred to as an upswelling of magma. As the magma rises, plates in the mid-ocean ridges are forced apart. New earth material is added to the edges which means new oceanic lithosphere is born.

[3] Convergent boundaries are found where lithospheric plates move toward each other. Eventually as these plates move toward each other, one plate subducts or overrides the other. This boundary is usually referred to as a **subduction zone**. As the subducting plate continues to move, the other plate is pushed downward toward the mantle where it will start to melt. The melting causes the plate to be reabsorbed into the earth. It is also the cause of some of the world's most destructive earthquakes. The northwest coasts of the United States, western Canada, and southern Alaska and Aleutian Islands have a subduction zone plate boundary.

[4] The third boundary is known as a transform fault. Plates in this boundary are sliding horizontally past each other without much upward or downward movement. There is also no crust destroyed or produced by the movement of these plates. This boundary is also referred to as a **strike-slip fault** or fracture zone. The famous San Andreas Fault along the coast of California and northwestern Mexico is a transform fault. Earthquakes in this boundary tend to happen at shallow depths.

[5] To understand plate boundaries, we also need to understand **faults**. Faults are a break or fracture in the earth's crust along where two blocks of crust have slipped or slid past each other. We know about strike-slip faults which move laterally. There are also **normal faults** and **thrust (reverse) faults**. Normal faults occur when there is pulling or tension as a result of a break in the rock. The rock which lies above the fault surface begins to move down in relation to the rock below the fault surface. Thrust or reverse faults happen when

there is compression or squeezing. Rocks above the fault surface move upward in relation to the rock below the fault surface. Strike-slip faults can happen with either type of stress (pulling or compression). Divergent boundaries usually have normal faults. Thrust or reverse faults usually occur along subduction zones.

[6] The one important finding by scientists about faults is that earthquakes tend to reoccur along faults. This makes sense because faults are areas where the earth's crust is the weakest. There used to be the belief that if stress were relieved on a fault, another earthquake would not occur. In fact, relieving stress in one area could add stress to another part of the fault. However, as Alfred Wegener and Arthur Holmes pointed out, the earth's surface is constantly shifting. Understanding plate boundaries and faults continues to help scientists as they monitor the earth's movement over time.

Name _____ Science Pd _____

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1. Strike-slip faults have plates that slide _____ past each other. (A) Vertically (B) Diagonally (C) Horizontally (D) Perpendicularly	2. Divergent boundaries usually have thrust or reverse faults. (A) False (B) True
3. Subduction zones are most often found _____. (A) In valleys (B) On islands (C) On the plains (D) Along coastlines	4. What are convergent boundaries?
5. Transform boundaries have plates that slide horizontally past each other. (A) False (B) True	6. Thrust faults tend to occur where there is _____. (A) Heating of the plates (B) Scraping of the plates (C) Compressing of the plates (D) Pushing of the plates
7. Why did seismologists initially believe that an area that experienced an earthquake would not experience another earthquake?	8. Where are thrust (reverse) faults usually located?