Continental Drift and Plate Tectonics Notes

**Part 1 – Alfred Wegener and Continental Drift**

Continental Drift is…

*The idea that the world’s land masses are slowly moving over time*

*PANGAEA*

*The supercontinent made of all continents that existed millions of years ago.*

*THE BREAKUP OF PANGAEA*

Alfred’s Evidences

1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*If you look closely at coastlines it appears that the continents can be pieced together like a puzzle. Especially if you look at the coasts of North and South America as they match up with Africa.*

2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Fossils of the same species are found on opposite shorelines of continents separated by vast oceans. The fact that these fossils are not found worldwide is evidence that the continents used to be together.*

3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*It appears that mountain ranges end abruptly on one continent and pick back up on another. Even the layers of rocks within these mountains match up – evidence that they used to be part of the same mountain range before the continents split.*

4: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

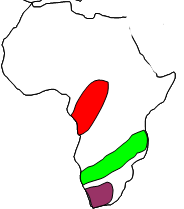
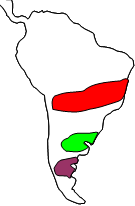
*Fossils of tropical plants are found in some (currently) cold regions of the Earth. Also, evidence of past glaciers is found in many places that are too warm for glaciers today. This is evidence that the continents have moved over time – thus the evidence of different past climates.*

Geometric Evidence

Fossil Evidence

Mountain Evidence

Climate Evidence



Before

After

Matching rock patterns

Ocean



HYPOTHESIS

THEORY

*Has evidence*

*Cannot explain the cause or the “how”*

*Has evidence*

*Explains the cause or the “how”*

**Part 2 – Alfred’s Rejection**

Why was Alfred rejected in his own time?

*Because although he had evidence he had* ***NO MECHANISM*** *to explain how the continents were moving. In other words, he could not explain HOW they were moving.*

**Part 3 – Harry Hess and Modern Evidence**

SONAR

MID-OCEAN RIDGES

Revealed

*Long underwater mountain ranges where magma rises up from the mantle.*

*Technology that uses sound waves to determine depths and sizes of objects*

HARRY HESS

SEAFLOOR SPREADING

Discovered

*The seafloor slowly grows outward from*

*mid-ocean ridges as new crust is formed, pushing the continents along for the ride.*

*This is the* ***MECHANISM*** *of continental drift!*

*Geologist and U.S. Naval Officer that came up with the idea that the continents move because the ocean floor is getting wider*

EVIDENCE OF SEAFLOOR SPREADING

THE AGE OF OCEAN ROCKS

*The fact that rocks get older at equal rates the farther away you get from a mid-ocean ridge is evidence of seafloor spreading*

MAGNETIC STRIPING

*The fact that magnetic stripes on the ocean floor are identical on both sides of a mid-ocean ridge is evidence of seafloor spreading*

SEAFLOOR SPREADING DIAGRAM

Mid-Ocean Ridge

Older

rocks

Younger

rocks

+

New rocks forms at ridge pushing old rock away

+

-

-

+

+

-

-

Older

rocks

Younger

rocks

**Part 4 – The Driving Forces of Plate Movement**

1. Convection

*Hot things rise and cold things sink because of changes in density. Convection acts like a conveyor belt, rolling the plates along on top.*

Convection Diagram

Driving Forces in Action

2. Gravity

*Force that pulls objects towards the Earth. Gravity moves plates by pulling them down at subduction zones.*

3. Pressure

*Force that pushes outward*

*against the space around it. Pressure moves the plates as rising magma pushes at the*

*mid-ocean ridge.*

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Gravity

Convection

Gravity

Convection

Pressure

Heats up

Becomes less dense

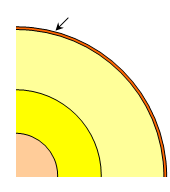
Molecules spread and rise

Cools down

Becomes more dense

Molecules condense and sink

**Part 5 – Plate Tectonics**



Lithosphere

Asthenosphere

Crust

Mantle

Outer

Core

Inner

Core

Plate Tectonics –

*The theory describing how Earth’s plates move and what happens when they interact with each other.*

Lithosphere –

*Made up of the crust and the top part of the mantle. Earth’s “plates” are made from this layer.*

Asthenosphere –

*The liquidy-solid (like silly putty) layer beneath the lithosphere. This is the layer that the plates float on. It is like a conveyor belt for the plates.*

Ocean Crust

Continental Crust

vs.

Thinner

More Dense

Younger

Thicker

Less Dense

Older

Ocean Crust

Continental Crust

**Part 6 - Plate Boundaries**

|  |  |  |  |
| --- | --- | --- | --- |
| Type of Boundary | Definition | What it creates | Picture |
| *Convergent*  *(Land Vs. Land)* | *Continental crust collides with continental crust* | *Mountains*  *Earthquakes*  *Subduction Zones* | `  ` |
| *Convergent*  *(Land Vs. Ocean)* | *Continental crust collides with oceanic crust* | *Volcanoes*  *Trenches*  *Earthquakes*  *Subduction Zones* |  |
| *Convergent*  *(Ocean Vs. Ocean)* | *Oceanic crust collides with oceanic crust* | *Island Arcs*  *Trenches*  *Earthquakes*  *Subduction Zones* |  |
| *Divergent* | *Two plates move away from each other, usually oceanic crust* | *Mid-Ocean Ridges*  *Earthquakes* |  |
| *Transform* | *Two plates scrape past each other* | *Earthquakes* |  |

Most of the world’s volcanoes and earthquakes…

*Happen at plate boundaries, especially convergent boundaries*

A hotspot is…

*A location that is volcanically active even though it is not located near a plate boundary*