GRADE 10	TERM 2	SOCIAL SCIENCES (GEOGRAPHY) GEOMORPHOLOGY UNIT 2: PLATE TECTONICS

LEARNING OUTCOMES:

- Changes in the position of continents over time
- Evidence for the movement of continents over time
- Plate-tectonics – an explanation for the movement of continents
- Mechanics of plate movements
- Processes and landforms associated with different kinds of plate boundaries
- The World's volcanic and earthquake zones

PLATE TECTONICS

This is a theory that developed in the 1960s that followed from the theory of Continental Drift.

Alfred Wegener proposed a theory in 1915 that all the continents, at one stage, were joined. This giant landmass was called **Pangaea** and the single ocean surrounding the rest of the planet was known as **Panthalassa**. He suggested that over time, this super continent broke up into two smaller landmasses called **Laurasia and Gondwanaland**. From this, the continents shifted into the positions in which we know them today.

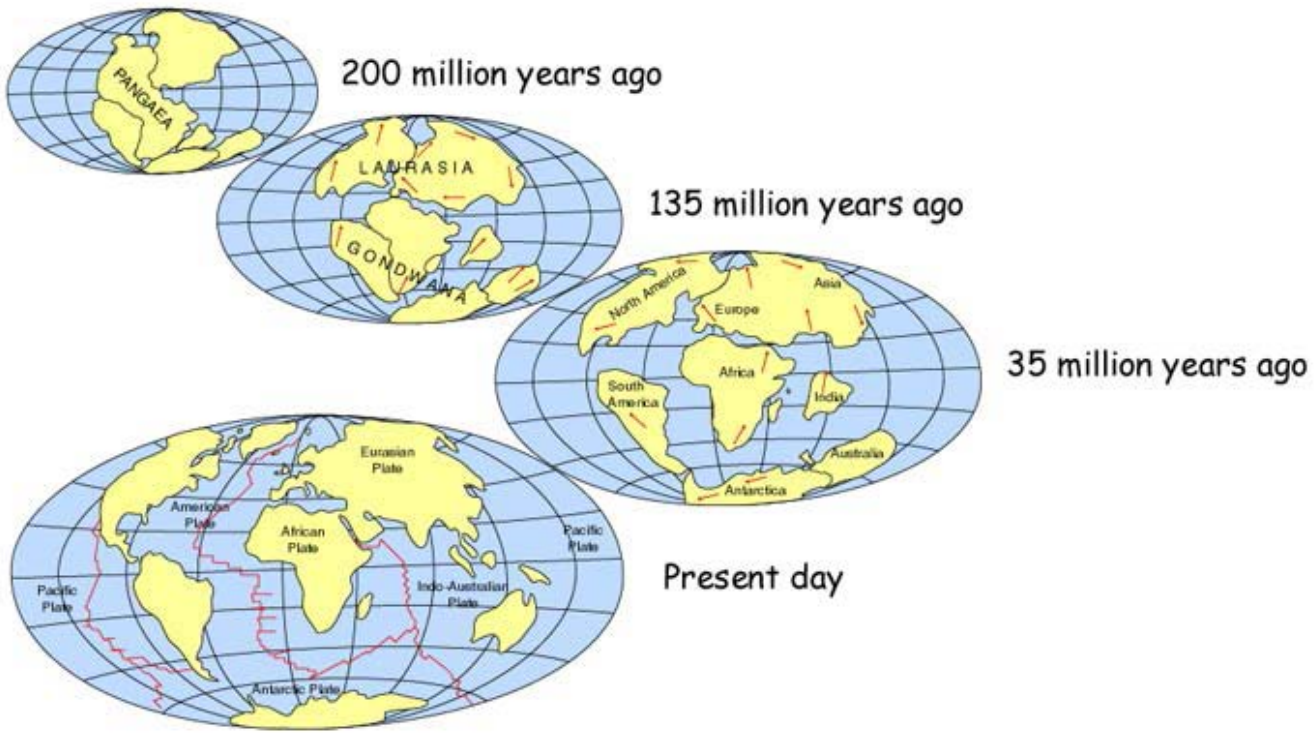


Figure 1: Continental Drift

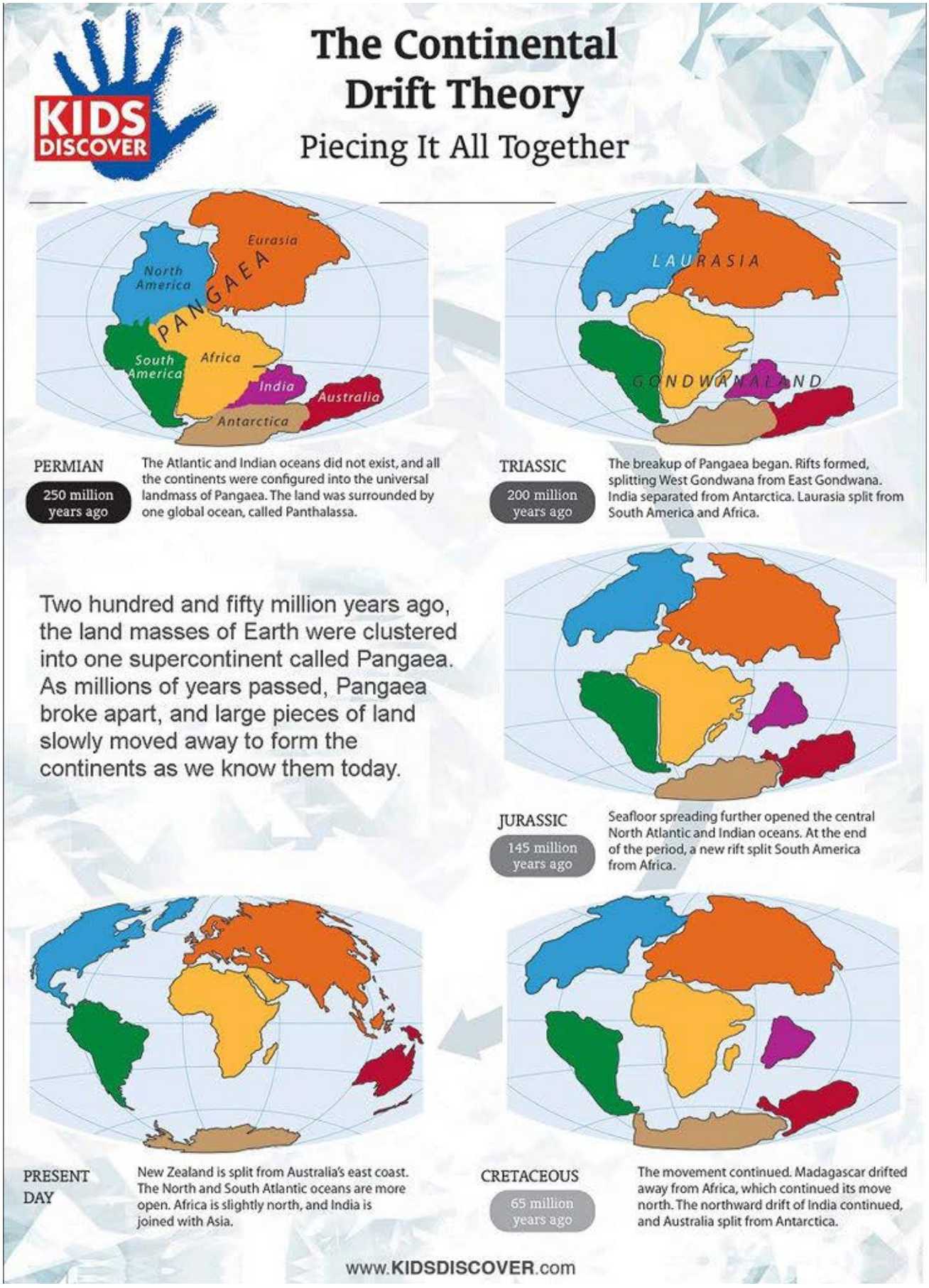


Figure 2: Theory of Continental Drift

ACTIVITY 1: CONTINENTAL DRIFT

1. Name the current continents that were part of the landmass known as Laurasia.

2. Name the current continents that were part of the landmass known as Gondwana.

3. In point form, summarise the evidence that suggests continental drift occurred.

4. Explain how igneous rocks can act as a sort of "metal compass" to support the theory of continental drift.

While many people did not accept Wegener's theory, new evidence in the 1960s proved that the continents had been in different positions in the past and had indeed moved. This became the theory of plate tectonics.

This theory suggests that the Earth is divided up into a series of plates. These plates are moving as a result of forces within the mantle. These plates are moving apart; or colliding together; or moving past each other side by side along the edges, or boundaries, of the plates. The action happening along the plate boundary will create different geological processes and landforms.

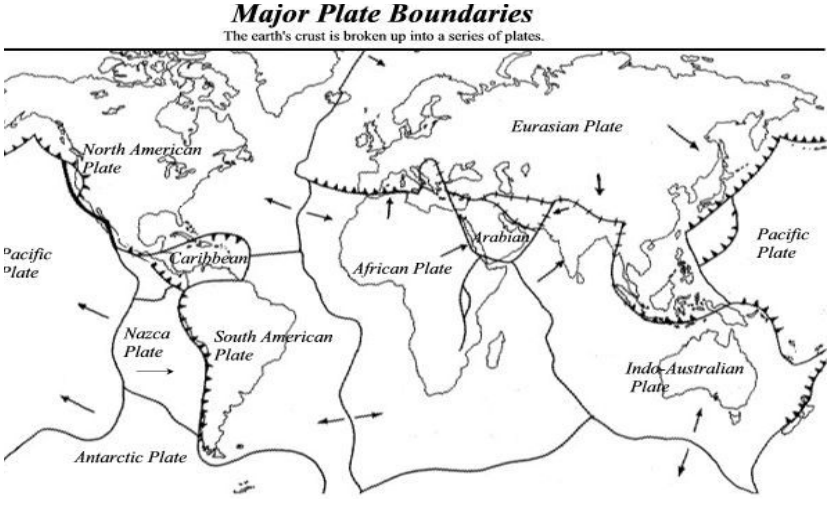


Figure 3: Continental Plates

So, how do the plates move?

1. Material in the mantle (MAGMA) is hottest closest to the outer core. This magma rises, until it reaches the crust.
2. The material at the crust cools and travels along under the crust – pulling the crust with it as a result of friction. *** This is what causes the crust above it to move, and essentially move the plates.
3. The material cools, and sinks back toward the core.
4. As it sinks, the pressure heats it and it rises – completing the cycle.

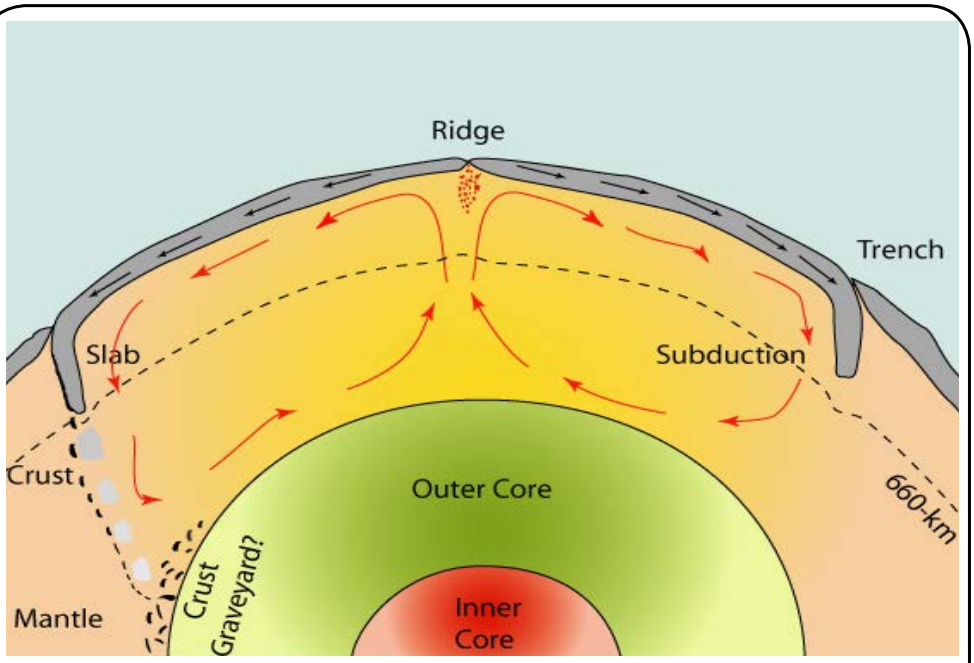


Figure 4: Convection currents in the mantle

Remember:

- Plates that move apart CREATE new crust.
- Plates that move together DESTROY crust.

ACTIVITY 2

1. In your own words, summarise how convection currents occur in the mantle.

TYPES OF PLATE BOUNDARIES

There are three types of plate boundaries. Draw a well-labelled diagram of EACH type of plate boundary below the description given.

A. Divergent Plate Boundary

These are also called CONSTRUCTIVE plate boundaries. These plate boundaries move apart (diverge) and magma rises to the surface which results in new crust being created. When this type of plate boundary occurs underneath the ocean, a mid-oceanic ridge is formed. When this happens with continental crust – a rift valley will form.

Diagram of a divergent plate boundary

ACTIVITY 3

1. Explain why new crust is created along divergent plate boundaries?

2. What type of landform do you think is most commonly found along divergent boundaries?

B. Convergent Plate Boundary

These plate boundaries are also DESTRUCTIVE plate boundaries. This plate boundary occurs when two plates collide (converge) into one another.

When an oceanic plate collides with a continental plate; the oceanic plate is heavier and will sink under the continental plate along a subduction zone. The same will happen if two oceanic plates collide – one will slip underneath the other.

Diagram showing an oceanic plate and continental plate colliding.

When two continental plates collide neither can slip, or subside, under the other so they are forced to collide and rise creating very large mountain ranges.

Diagram illustrating two continental plates colliding

C. Transform Boundaries

These are plate boundaries that move past each other side by side. As the plates grind past each other, stress in the plate builds and when released; creates shockwaves and tremors that pass through the plate. These plates are then associated with earthquake activity.

Diagram illustrating a transform plate boundary

Remember: a plate may have more than one plate boundary activity along its edges.

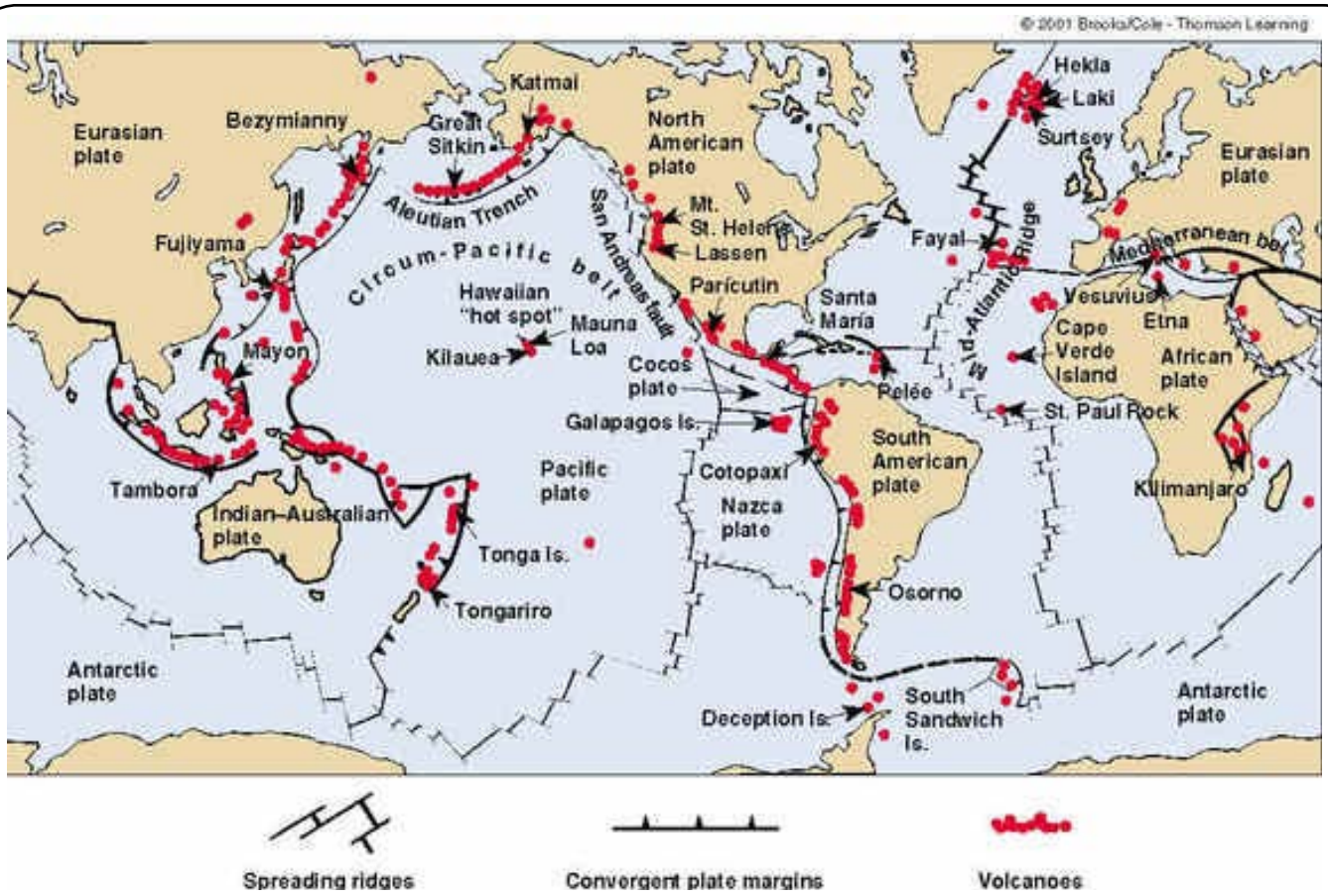
ACTIVITY 3

1. Give the names of TWO places in the world where the following plate boundaries could occur?
   a. A transform plate boundary:

   b. A divergent plate boundary:

   c. A convergent plate boundary:

2. Explain why volcanoes and earthquakes are often found along the edges of convergent plate boundaries between oceanic and continental plate boundaries.



http://goo.gl/Ph5jRw

Map showing zones of earthquakes and volcanoes