

Structure of the Earth & Plate Tectonics

Q1.

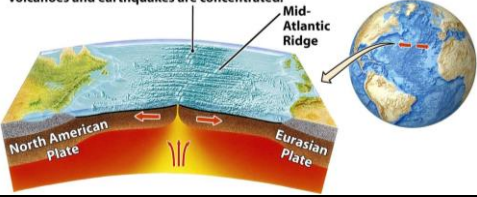
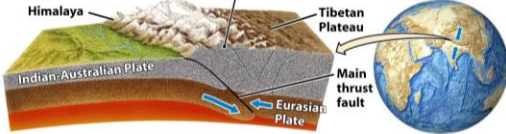
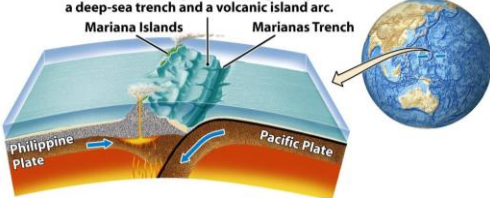

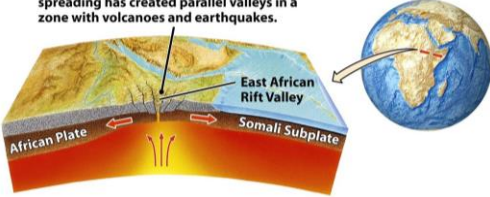
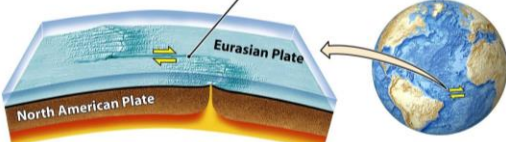
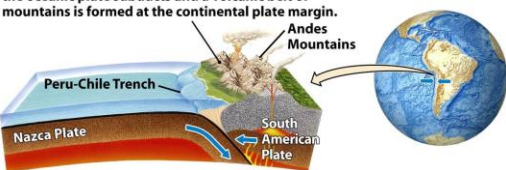
	Has the plate area increased, decreased, OR neither?	What type of stress? (Shear, Compressional, OR Tensional)	What type of plate boundary? (Transform, Convergent, OR Divergent)
<p>Rifting and spreading along a narrow zone have created the Mid-Atlantic Ridge, a mid-ocean mountain chain where volcanoes and earthquakes are concentrated.</p> 			
<p>When two continental plates collide, the crust crumples and thickens, creating high mountains and a wide plateau.</p> 			
<p>When two oceanic plates converge, they form a deep-sea trench and a volcanic island arc.</p> 			
<p>The San Andreas fault in California, where the Pacific Plate slides past the North American Plate, is an example of a transform fault that offsets continental crust.</p> 			
<p>In East Africa, an earlier stage of rifting and spreading has created parallel valleys in a zone with volcanoes and earthquakes.</p> 			
<p>Spreading centers are offset by mid-ocean ridge transform faults, where the two oceanic plates slide horizontally past each other.</p> 			
<p>When an oceanic plate meets a continental plate, the oceanic plate subducts and a volcanic belt of mountains is formed at the continental plate margin.</p> 			

Figure 1: Tectonic scenarios on Earth, Grotzinger/Jordan, 8th edition, pages 30f

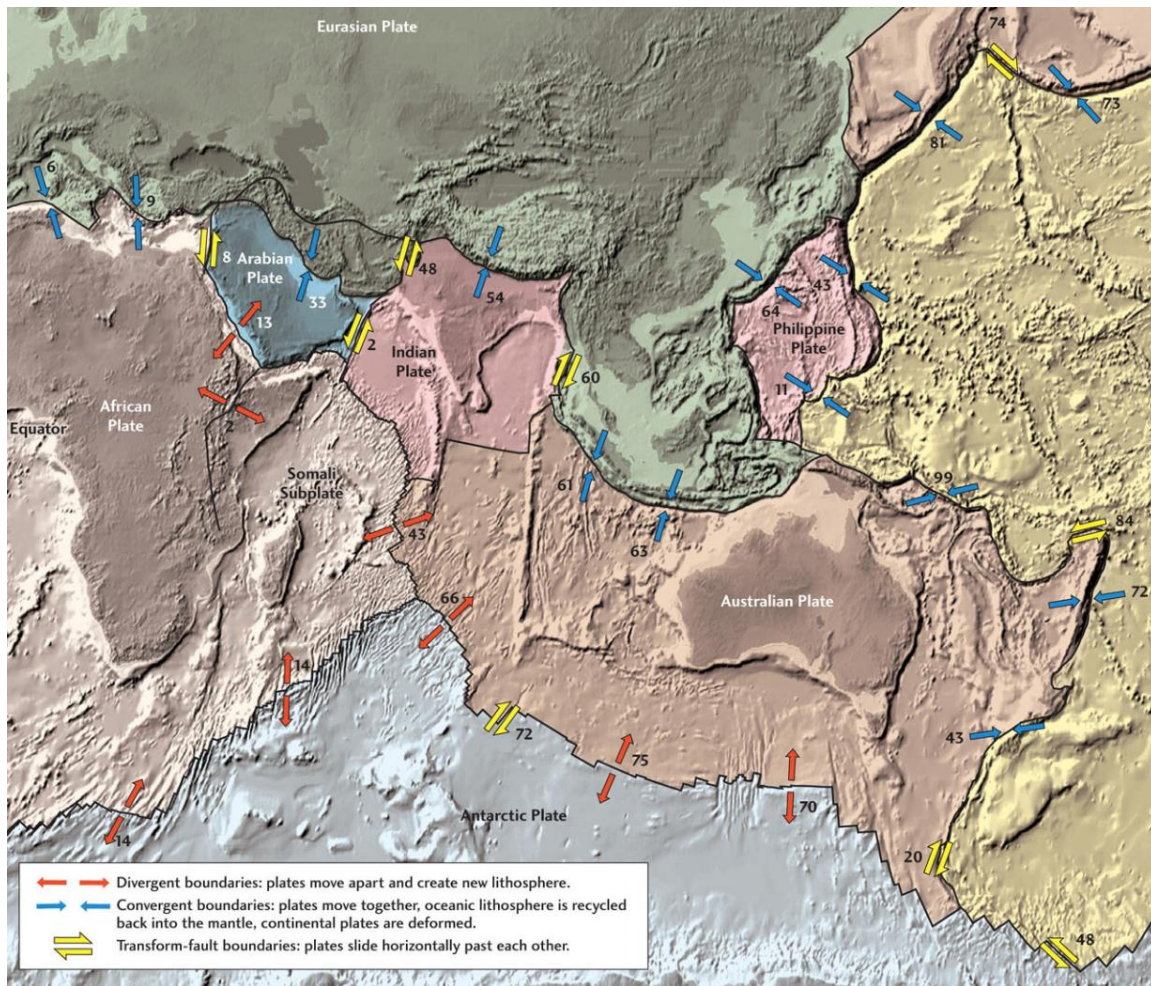


Figure 2: Part of Earth's tectonic plates mosaic. The arrows show the relative movement (in mm/a) of two plates at the respective point along their boundary. Grotzinger/Jordan, 8th edition, page 28

Q2. Refer to Figures 1 and 2 above. (Answers should short)

- On the map above, what is the fastest rate of relative movement for any of the plate boundary locations? Include units.
- What are the names of the **two tectonic plates** bounded at this fastest location? What type of plate boundary is it?

- c) In your own words, explain the **five geologic processes** that occur along convergent plate boundaries. Choose from these: type of plate movement, type of stress, mountain building, volcanism, earthquakes. You may need a chromebook.

- d) In your own words, explain the **three geologic processes** that occur along transform plate boundaries. Choose from these: type of plate movement, type of stress, mountain building, volcanism, earthquakes. You may need a chromebook.

- e) Name **one geologic process** that is missing at transform-fault boundaries. Hint: It is either plate movement, stress, mountain building, volcanism, or earthquakes. You may need a chromebook.

Q3. Observe the rising and sinking motion of the wax in the lava lamp
https://www.youtube.com/watch?v=h_IQ2tMgLVM (Lava Lamp Yellow 4+ Hours Of Relaxing Decompress Enjoy See Bonus 16X Speed At 4hrs 6 Min)

Note that the lava lamp contains wax and water only, and there is a heat source at the bottom.

- a) Sketch, label and describe the motions of the wax that occur in one minute.

- b) What causes the “lava” to move from the base of the lamp to the top of the lamp?

- c) What causes the “lava” to move from the top of the lamp to the base of the lamp?

- d) What is the name applied to this kind of cycle of change?

Q4.

- a) Which two **similarities** do you see between the lava lamp and the Earth’s mantle?

- b) Which two **differences** do you see between the lava lamp and the Earth’s mantle?

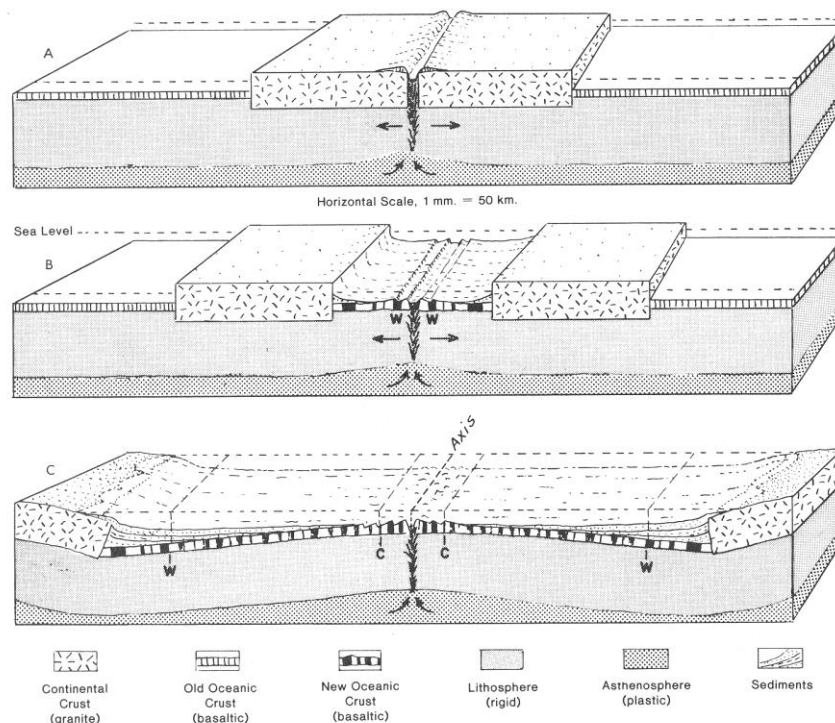


Figure 3: Block diagrams showing the stages in formation of an oceanic basin and the separation of two continents. A divergent margin (Laboratory studies in Earth History, 5th edition, 1993, p. 48)

Q5. Refer to Figure 3, block model C.

- Is the seafloor at “C” older or younger than the sea floor at “W”?
- Why are the strips at “C” and at “W” at the same distance on both sides of the mid-oceanic ridge?
- Is the sediment on the seafloor younger or older than the underlying basalt lava rock?
- Why would the thickness of the sediment be expected to increase further away from the ridge and nearer to the continents?