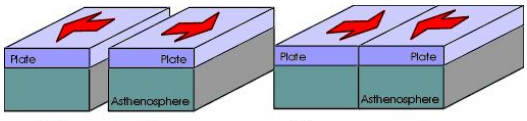
2018 Captains Tryouts: Dynamic Planet key

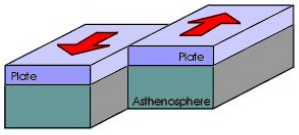
~NCSSM, NC~

Each part is 1 pt unless otherwise specified.

Total: 83pt

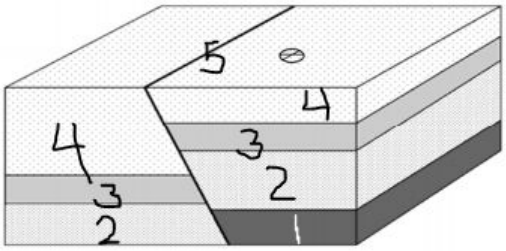
1. *(1 pt for each)*
   Sial: crust's upper layer' made up of rocks abundant in silicate and aluminum-based materials; runs from ~5-70km below the surface; continental crust(granite) mostly made of this
   Sima: crust's lower layer; has rock with an abundance of magnesium silicate minerals; oceanic crust(basalt) mainly made of this
2. *(1 pt for each)* The slow movement of hot, softened mantle that lies below the rigid plates. Forces associated with subduction are more important than seafloor spreading
3. *(1pt for naming and 1 pt for description)*
   -Embryonic: heat source beneath lithosphere creates uplift and begins to split a continent apart; uplift; complex system of linear rift valleys on continents; ex. East African rift valleys
   -Juvenile: characterized by further spreading, down dropping, and the formation of a narrow linear sea; divergence; narrow seas with matching coasts; ex. Red Sea
   -Mature: ocean basin is fully developed with a mid-ocean ridge running down the middle; divergence; ocean basin with continental margins; ex. Atlantic and Arctic Oceans
   -Declining: subduction zone occurs along continental margin and plates come back together; ocean basin shrinks; convergence; island arcs & trenches around basin edge; ex. Pacific Ocean
   -Terminal: plates come back together, creating a progressively narrower ocean; convergence and uplift; narrow, irregular seas with young mountains; ex. Mediterranean Sea
   -Suturing: ocean disappears, continents collide, and tall uplifted mountains are created; convergence and uplift; young to mature mountain belts; ex. Himalaya Mountains



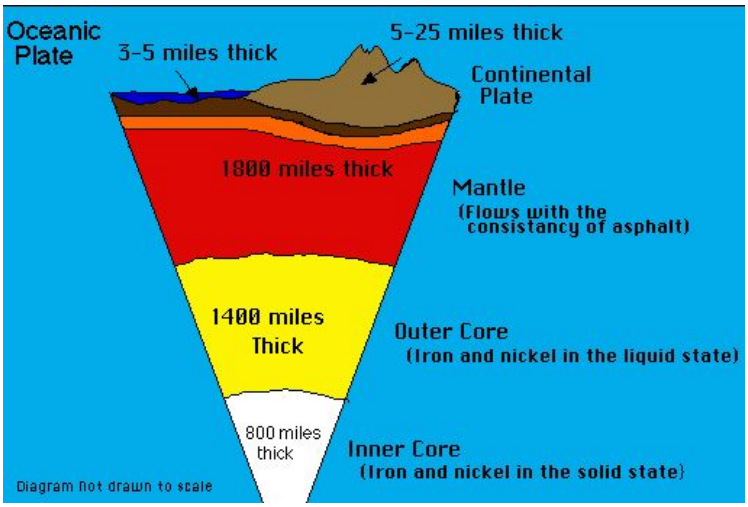


4. (1pt for each)
5. 0.5-4 in/yr
6. D
7. A
8. B
9. C

10. (1pt for each) A supercontinent that existed during the late Paleozonic and early Mesozoic eras (250-180mya)
11. a) Triple Junction: formed by a 3-way split in the crust allowing massive lava flows; split caused by an upwelling of magma that broke the crust in 3-directions and poured lava over 100s of mi^2 of Africa and S.A.
    b) aulacogen: failed arm of a triple junction of a plate tectonics rift system; fails or stops spreading when continental break-up develops; becomes a filled graben system within the continent
    c) Mantle Plumes: Columnar areas of hot molten rock that arise from deep within the mantle; likely related to the positions of convection cells in the mantle; some come from core-mantle boundary while others have shallower source. May underlie oceanic crust at spreading zone
    d) Extensive, deep fault systems that cut through the entire thickness of continents; characterized by crustal extension and bordered by faults
12. Observed bend in hotspot tracks is likely due to the slight movement (<1 cm/yr with some exceptions like Hawaii) of hotspots and changing motion of the plate
13. Over 100 hotspots have been active within the past 10 million years.
14. (1 pt for each name, 1 pt for each difference)
    p (primary) waves: compression waves; fastest seismic waves; move at 14000mph at the surface to >25000mph through Earth's core; can pass through the entire earth
    s (secondary) waves: shear waves; travel at about ½ the speed of p waves; can only move through solids (crust and mantle not outer core)
15. 9.5
16. 1980 eruption of Mt. St. Helens
17. *(1pt for O2 and Si; 1pt for others)* oxygen (>50%), silicon (>25%), aluminum, iron, calcium, sodium, magnesium, potassium
18. (1pt for each) Kilauea, Mauna Loa, Mauna Kea, Hualalai, Kohala
19. (1 pt each) *Contractional hypothesis:* based on the concept of an original liquid Earth followed by the long-term cooling and shrinking; not accepted today
20. Assumed that sedimentary rocks, now folded in a mountain range, were deposited in *geosynclines* (large, linear subsiding marine troughs)
21. *(1 pt for each def, 1pt for each ex)*
    a) Hot Spots: intense volcanic activity that remain approx. same location over long periods of geologic time; e.g. Yellowstone and Hawaii;
    b) Nematath: A chain of extinct volcanoes that is progressively older as one travels away from a hot spot ex. Hawaiian Islands-Emperor Seamount chain
22. (1pt for each) *Alfred Wegener;* the continents were once together but have been moving away from one another
23. *(2pt)* The ocean floor is spreading apart and new seafloor is forming. The igneous rock of the ocean floor preserves Earth's existing magnetic field as the rock cools. The polarity of Earth's magnetic field experiences reversals.



24. *(1pt for each correct number + 1 pt for fault)*
25. *(1pt for each)* lithosphere: zone of rigid, brittle rock; made up of crust and upper layer of the mantle
    asthenosphere: zone of asphalt-like consistency; layer below the rigid lithosphere; part of the mantle that flows and moves the plates
26. *(1pt for diff; 1 pt for each ex)* Passive margin has little tectonic activity, while active margins do. An example of a passive margin is the East Coast of the US and the West Coast of the US is an active margin.
27. Large continental craton that forms the ancient geological core of the North American continent.
28. *(1pt for each)* Western United States; Last of 3 mountain building event, the Laramide orogeny, 70-40 million years ago
29. *(1pt for each)* The Rockies are hundreds of miles farther inland; the reason most likely lies with an unusual subducting slab.
30. 480 million years ago
31. *(1 pt for each layer + 1pt for correct depth)*



Crust: 5-40km
Mantle: 2900km
Outer Core: 2250km
Inner Core: 1300km