

Name: _____ Date: _____

Feeling the Heat: Lithospheric Stress & Magmatic Evolution Quiz for 11th Grade

Junior geologists synthesize complex data on isostasy, rheology, and seismic tomography to predict tectonic shifts during this rigorous summative assessment.

1. Which specific seismic observation provides the most definitive evidence for the presence of a liquid outer core and a solid inner core?

- A. The complete absence of P-waves in the shadow zone between 105° and 142°.
- B. The termination of S-waves at the mantle-core boundary and P-wave refraction into the inner core.
- C. The acceleration of Surface waves as they pass through the oceanic lithosphere.
- D. A uniform decrease in velocity for both P and S waves at the Moho Discontinuity.

2. The _____ process occurs when a slab of oceanic crust sinks into the mantle, pulling the rest of the plate behind it due to negative buoyancy.

- A. Ridge Push
- B. Mantle Plume
- C. Slab Pull
- D. Basal Drag

3. Deep-focus earthquakes (depths >300km) are primarily associated with transform plate boundaries like the North Anatolian Fault.

- A. True
- B. False

4. Consider the formation of the Japanese Archipelago. Which petrological process best explains the generation of its calc-alkaline magmas?

- A. Decompression melting of the asthenosphere at a mid-ocean ridge.
- B. Flux melting caused by the dehydration of a subducting oceanic slab.
- C. Partial melting of a continental craton via a fixed mantle plume.
- D. Anatexis of sedimentary rocks at a transform strike-slip fault.

5. If an earthquake's P-waves arrive at 10:00:00 AM and S-waves arrive at 10:04:30 AM, the total _____ - _____ interval is used to calculate the distance to the epicenter.

- A. Arrival-Departure
- B. Refraction-Reflection
- C. S-P Lag
- D. Velocity-Time

6. The Wadati-Benioff zone is a planar zone of seismicity corresponding to the down-going slab in a subduction zone.

- A. True

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B. False

7. Why does the East Pacific Rise exhibit a much smoother, broader profile compared to the rugged, steep topography of the Mid-Atlantic Ridge?

- A. The East Pacific Rise is a convergent boundary, not a divergent one.
- B. Faster spreading rates lead to higher heat flow and a more plastic response in the crust.
- C. The Mid-Atlantic Ridge is located over a massive, stationary hotspot.
- D. Sediment accumulation is higher in the Pacific, masking the volcanic peaks.

8. A _____ volcano, such as Mauna Loa, is characterized by low-viscosity basaltic lava flows and a wide, gently sloping profile.

- A. Stratovolcano
- B. Cinder Cone
- C. Shield
- D. Lava Dome

9. Which of the following would likely occur if the asthenosphere were to become completely solid and rigid?

- A. The rate of seafloor spreading would increase due to increased friction.
- B. Plate tectonics would cease as the lithosphere could no longer move over a ductile layer.
- C. Hotspot volcanism would become more frequent in the center of plates.
- D. Magnetic pole reversals would occur every 10,000 years.

10. Paleomagnetism supports the theory of seafloor spreading because magnetic stripes on the ocean floor are asymmetrical relative to the mid-ocean ridge.

- A. True
- B. False