Name: _____ **Date:** _____

Answer Key: Shatter the Surface: A 4th Grade Tectonic Trek Quiz

Can you predict where the next mountain will rise? Analyze the mechanics of subduction zones and seismic waves through complex geological scenarios.

---

1. Imagine you are a geologist studying the 'Ring of Fire.' You find a deep ocean trench next to a string of volcanic islands. Which process is most likely occurring here?

Answer: C) One plate is sinking beneath another, melting into magma as it reaches the mantle.

This is called subduction. In 4th grade science (NGSS ESS2.B), we learn that when an oceanic plate meets a continental plate, the heavier one sinks, creating both deep trenches and volcanic chains.

2. Seismic waves travel at different speeds through various layers of the Earth, helping scientists map what the inside of our planet looks like.

Answer: A) True

True. Advanced geology relies on 'seismic tomography,' where vibrations from earthquakes act like an X-ray to show us solid and liquid layers beneath the crust.

3. When tectonic plates snag and lock together, extreme tension builds up. The sudden release of this stored energy at the _____ is what we feel as an earthquake.

Answer: B) Focus (Hypocenter)

While the 'epicenter' is the spot on the surface, the 'focus' or 'hypocenter' is the actual point underground where the rock first breaks or slips.

4. If you move to Iceland, you are standing on a spot where the North American and Eurasian plates are moving away from each other. What feature are you standing on?

Answer: C) A divergent boundary rift

Iceland sits on the Mid-Atlantic Ridge, a divergent boundary where plates pull apart and volcanic activity creates new land.

5. Tectonic plates are made of the Earth's crust and the very top solid part of the mantle, together called the lithosphere.

Answer: A) True

Name: _____ **Date:** _____

Correct. The lithosphere is the rigid outer shell that is broken into the 'puzzle pieces' we call tectonic plates.

6. The _____ describes how most earthquakes occur: plates bend under stress like a rubber band and then snap back to a new position.

Answer: B) Elastic Rebound Theory

Elastic rebound explains why the ground shakes when rocks finally break after being pushed or pulled for years.

7. Which of these designs would best help a skyscraper in Tokyo, Japan survive a major earthquake based on engineering principles?

Answer: C) Equipped with base isolators (rubber pads) to absorb seismic energy.

Base isolators decouple the building from the shaking ground, which is a key engineering solution for schools and hospitals in earthquake zones.

8. Scientists use a tool called a _____ to record the magnitude and duration of the vibrations caused by tectonic movement.

Answer: D) Seismograph

A seismograph (or seismometer) creates a visual record called a seismogram, which shows the patterns of P-waves and S-waves.

9. Volcanoes can only form at the edges where two tectonic plates meet.

Answer: B) False

False. While most form at boundaries, 'hotspots' (like the one under the Hawaiian Islands) can create volcanoes in the middle of a plate.

10. What is the primary engine that causes the plates above it to move across the Earth's surface?

Answer: B) Convection currents in the mantle transferring heat from the core.

As the mantle is heated by the core, the warmer rock rises and cooler rock sinks, creating a 'conveyor belt' effect that carries the plates.