

Name: _____ Date: _____

Sifting Through the Sands of Time: Geologic Deep Dive for Grade 10

Piece together the puzzle of Earth's history by synthesizing isotopic data, index fossils, and stratigraphy to reconstruct lost worlds.

1. An igneous intrusion cuts through several layers of sedimentary rock, which in turn contains inclusions of a nearby granite. According to the Principle of Cross-Cutting Relationships and the Principle of Inclusions, which of the following is the most accurate sequence of events?

- A. The sedimentary rock formed, then the granite eroded, then the intrusion occurred.
- B. The granite is the oldest feature, followed by the sedimentary rock, and finally the intrusion.
- C. The intrusion is older than the granite but younger than the sedimentary rock.
- D. The sedimentary rock is the oldest, followed by the intrusion and the granite.

2. A geologist finds a layer of volcanic ash that contains Zircon crystals with a Parent-to-Daughter ratio of 25% Uranium-235 to 75% Lead-207. Given that the half-life of U-235 is 704 million years, the rock is approximately _____ million years old.

- A. 352
- B. 704
- C. 1,408
- D. 2,112

3. The 'Great Oxygenation Event,' evidenced by Banded Iron Formations (BIFs), occurred primarily due to the metabolic activities of anaerobic heterotrophs during the Archean Eon.

- A. True
- B. False

4. Which set of characteristics would make a fossil the most effective 'Index Fossil' for correlating strata across different continents?

- A. Narrow geographic range and long evolutionary lifespan.
- B. Wide geographic range and short evolutionary lifespan.
- C. Found only in deep marine environments over billions of years.
- D. Rarity of preservation and high complexity of anatomical structures.

5. The transition from the Paleozoic Era to the Mesozoic Era is marked by the 'Great Dying' or the _____ Extinction, which eliminated roughly 96% of marine species.

- A. Cretaceous-Paleogene
- B. Late Devonian
- C. Permian-Triassic
- D. Ordovician-Silurian

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6. A disconformity represents a period of tectonic tilting and uplift followed by the deposition of horizontal strata on top of the angled layers.

- A. True
- B. False

7. How does the discovery of *Glossopteris* flora fossils across Antarctica, India, and South America provide evidence for plate tectonics?

- A. It suggests these seeds were capable of floating across vast saltwater oceans.
- B. It indicates that identical species evolved independently in similar climates.
- C. It supports the existence of the supercontinent Gondwana and subsequent continental drift.
- D. It proves that the entire Earth once shared a uniform tropical climate.

8. The principle of _____ states that in an undisturbed sequence of rocks, each layer is older than the one above it and younger than the one below it.

- A. Lateral Continuity
- B. Superposition
- C. Original Horizontality
- D. Faunal Succession

9. Which of the following geochemical signatures in the rock record would most likely indicate a massive bolide (asteroid) impact?

- A. Anomalously high concentrations of Iridium.
- B. A sudden increase in Carbon-14 isotopes.
- C. The presence of extensive limestone deposits.
- D. High levels of localized basaltic flow.

10. Carbon-14 dating is an effective method for determining the age of *Tyrannosaurus rex* fossils from the Late Cretaceous.

- A. True
- B. False