

Name: _____ Date: _____

Stardust & Strata: 10th Grade Deep Time Paradox Quiz

Sophomores analyze isotopic decay curves, faunal succession, and tectonic anomalies to synthesize a coherent model of Earth's bio-geologic evolution.

1. A geologist identifies a layer of volcanic ash containing Zircon crystals with a U-235 to Pb-207 ratio suggesting three half-lives have passed. If the half-life of U-235 is ~704 million years, what is the best estimate for the age of the underlying sedimentary strata?

- A. Approximately 235 million years
- B. Minimum of 2.1 billion years
- C. Maximum of 541 million years
- D. Exactly 1.4 billion years

2. The use of _____ (taxa like Conodonts or Graptolites) allows geologists to correlate strata across distant basins because these organisms were widespread, abundant, and existed for a short chronostratigraphic duration.

- A. Trace fossils
- B. Index fossils
- C. Lazarus taxa
- D. Living fossils

3. The Great Oxygenation Event (GOE), roughly 2.4 billion years ago, is primarily evidenced by the appearance of Banded Iron Formations (BIFs) in the geologic record.

- A. True
- B. False

4. Which of these scenarios best illustrates the application of Smith's Principle of Faunal Succession in a high-resolution stratigraphic study?

- A. Using cross-cutting relationships to date a basaltic dike
- B. Assuming that the same species of Brachiopods at two sites indicates contemporaneous deposition
- C. Calculating the cooling rate of metamorphic basement rock
- D. Identifying an angular unconformity between two limestone beds

5. The _____ represents an erosional gap in the rock record where Cambrian sedimentary rocks sit directly atop billion-year-old metamorphic rock, signifying a massive loss of geologic information.

- A. Permian Extinction
- B. Great Unconformity
- C. K-Pg Boundary
- D. Hadean Eon

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6. Steno's Law of Original Horizontality suggests that if rock layers are found tilted at steep angles, they must have been moved by tectonic forces after their initial deposition.

- A. True
- B. False

7. Why is Carbon-14 dating ineffective for determining the age of a Stromatolite fossil from the Archean Eon?

- A. Stromatolites are inorganic structures and do not contain carbon.
- B. The half-life of Carbon-14 is too short (approx 5,730 years).
- C. Archean rocks have been subjected to too much heat for carbon to remain.
- D. Isotopic nitrogen prevents the accurate measurement of carbon decay.

8. In taphonomy, the process of _____ involves the cellular-level replacement of organic structures by silica or pyrite, preserving minute anatomical details of the organism.

- A. Permineralization
- B. Carbonization
- C. Recrystallization
- D. Histometabasis

9. The presence of *Glossopteris* flora across South America, Africa, India, and Antarctica is used as primary evidence for the theory of continental drift and the existence of Gondwana.

- A. True
- B. False

10. An analysis of stable oxygen isotopes (O-18/O-16) in Foraminifera shells from deep-sea sediment cores is used by paleoclimatologists to synthesize what type of data?

- A. Changes in global ice volume and ocean temperature
- B. The exact date of the magnetic pole reversal
- C. The speed of the North American tectonic plate
- D. The respiratory rate of ancient marine mammals