Name: _____ **Date:** _____

Answer Key: Dissect Earth's Deep History: A 10th Grade Fossil Analysis Quiz

Sophomores evaluate faunal succession, radioactive decay, and index fossils through 10 analytical questions requiring synthesis of geological and biological evidence.

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1. Which principle allows geologists to correlate sedimentary strata across vast distances based on the predictable sequence of organism appearances and disappearances?

Answer: B) Principle of Faunal Succession

Faunal succession states that fossils succeed one another in a definite and determinable order, allowing for the relative dating of rock layers globally.

2. The _____ of an index fossil must be geographically widespread but limited to a very short duration of geologic time to be useful for precise stratigraphic correlation.

Answer: C) Distribution

Distribution refers to the spatial range; for a fossil to be a diagnostic 'index,' it must be found across many regions but only within a narrow vertical layer of rock.

3. Carbon-14 dating is the most effective method for determining the absolute age of a fossilized Brachiosaurus femur found in Jurassic limestone layers.

Answer: B) False

Carbon-14 has a half-life of only 5,730 years and cannot be used for samples older than about 50,000 years; Jurassic fossils require isotopes with much longer half-lives like Uranium-238.

4. If you discover fossilized Glossopteris flora across South America, Africa, and Antarctica, what is the most scientifically sound inference regarding the Permian Period?

Answer: A) These landmasses were once connected as part of Gondwana.

The distribution of Glossopteris is a key piece of evidence for plate tectonics and the existence of the supercontinent Gondwana.

5. A scientist finds an unconformity where the fossil record shows a sudden lack of biodiversity; this 'break' in the rock record is often interpreted as a(n) _____.

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Answer: C) Erosional Gap

An unconformity represents a period of non-deposition or erosion, meaning the physical evidence of that time's history (and its fossils) has been lost from the sequence.

6. Which of the following conditions would most likely result in the preservation of soft-body tissues, a phenomenon seen in the Burgess Shale?

Answer: C) Rapid burial in an anaerobic (oxygen-poor) environment

Anaerobic conditions prevent decomposition by bacteria, and rapid burial protects the organism from scavengers and physical weathering.

7. Coprolites and gastroliths are categorized as body fossils because they provide direct biological information about the organism's digestive system.

Answer: B) False

These are 'trace fossils' (ichnofossils) because they provide evidence of behavior or biological activity rather than being a part of the organism's physical body skeleton.

8. What does the appearance of 'Stromatolites' in the fossil record primarily signify regarding Earth's atmospheric evolution?

Answer: B) The beginning of the 'Great Oxygenation Event'

Stromatolites are formed by cyanobacteria, which were the first organisms to perform oxygenic photosynthesis, leading to oxygen accumulation in the atmosphere.

9. The transition from the Paleozoic Era to the Mesozoic Era is marked by the _____ Extinction, the largest mass extinction in Earth's history.

Answer: C) Permian-Triassic

The Permian-Triassic extinction, also known as 'The Great Dying,' saw the loss of approximately 96% of marine species and 70% of terrestrial vertebrates.

10. Phyletic gradualism suggests that the fossil record should show a constant, slow rate of evolutionary change rather than sudden bursts of diversification.

Answer: A) True

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Gradualism is the hypothesis that evolution occurs by the accumulation of small changes, whereas Punctuated Equilibrium suggests rapid changes between long periods of stability.