

Name: _____ Date: _____

Answer Key: Crack the Lithic Code: High School Crustal Chronicles Quiz

Challenge the limits of deep time by synthesizing isotopic data and analyzing biotic responses to paleoclimatic shifts throughout the Phanerozoic.

1. Which principle of relative dating would a geologist primarily use to argue that a basaltic dike cutting through layers of shale is younger than the shale itself?

Answer: C) Principle of Cross-Cutting Relationships

The Law of Cross-Cutting Relationships states that any feature (like an intrusion or fault) that cuts across a body of rock must be younger than the rock it cuts.

2. To determine the absolute age of an ancient zircon crystal from the Hadean Eon, scientists measure the decay of _____ into Lead-206.

Answer: B) Uranium-238

Uranium-238 has a half-life of approximately 4.47 billion years, making it the standard clock for dating the oldest materials on Earth, unlike Carbon-14 which decays too quickly.

3. The Great Oxygenation Event, recorded in banded iron formations, was primarily caused by the metabolic activity of early terrestrial plants.

Answer: B) False

The Great Oxygenation Event was caused by cyanobacteria (blue-green algae) in the oceans, long before the evolution of terrestrial plants.

4. The presence of *Glossopteris* flora across South America, Africa, India, and Antarctica serves as critical paleobiological evidence for which theory?

Answer: C) Continental Drift

The distribution of this specific seed fern across unconnected continents suggested they were once joined in the supercontinent Gondwana.

5. Which of the following represents an 'index fossil'—a species used to define and identify geologic periods due to its wide distribution and short evolutionary lifespan?

Answer: A) Graptolites

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Graptolites are ideal index fossils because they evolved rapidly and had a global marine distribution, whereas stromatolites span billions of years.

6. The 'Cambrian Explosion' refers to the rapid diversification of _____ which introduced most major animal phyla to the fossil record.

Answer: B) Multicellular marine organisms

The Cambrian Explosion (approx. 541 mya) marked a pivot point where complex, multicellular life with hard parts rapidly appeared in the fossil record.

7. An unconformity in the rock record represents a substantial gap in time where no sediment was deposited or existing rock was eroded away.

Answer: A) True

Unconformities are 'missing pages' in Earth's history book, representing intervals of time not recorded by strata.

8. What geochemical signature found at the K-Pg boundary worldwide supports the hypothesis of a massive bolide impact 66 million years ago?

Answer: B) A global layer of Iridium

Iridium is rare in Earth's crust but abundant in asteroids; its presence in a thin clay layer globally marks the impact that ended the Mesozoic.

9. Permineralization occurs when mineral-rich _____ seeps into the pore spaces of an organism's remains, eventually crystallizing into stone.

Answer: B) Groundwater

Groundwater carries dissolved minerals like silica or calcite into the cellular voids, preserving the internal structure of the organism.

10. The principle of Uniformitarianism suggests that the biological and physical processes occurring today are fundamentally different from those in the geologic past.

Answer: B) False

Uniformitarianism is summarized as 'the present is the key to the past,' implying that the laws of nature have remained constant over time.