Name: _____ **Date:** _____

Answer Key: Crush the Taxon Tree: 6th Grade Classification Challenge

Evaluate complex biological hierarchies and analyze evolutionary relationships using modern cladistics before moving into advanced genetics.

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1. An organism is discovered in a sulfurous hot spring. It is unicellular, lacks a nucleus, and its cell membrane contains unique lipids not found in bacteria. How should this be classified?

Answer: C) Domain Archaea

Archaea are prokaryotic (no nucleus) but possess distinct biochemical features, like specialized membrane lipids, that allow them to survive in extreme environments where bacteria cannot.

2. In the Linnaean system, if two organisms belong to the same 'Class,' they MUST also share the same _____.

Answer: C) Phylum

Taxonomy is a nested hierarchy. Any level above the shared rank (Kingdom, Phylum) must be the same, while levels below (Order, Family) can differ.

3. True or False: Using the Binomial Nomenclature system, the species name of an organism provides more information about its close relatives than the genus name.

Answer: B) False

The Genus name indicates a group of closely related species. The species name is a specific identifier; knowing the Genus allows you to identify immediate relatives.

4. Which piece of evidence is considered the most 'sophisticated' and accurate for modern scientists when reclassifying an organism that was previously grouped by physical appearance?

Answer: B) Comparing DNA sequences and proteins

Genetic analysis (molecular biology) reveals evolutionary relationships that are more accurate than 'analogous structures' which might look similar but evolved independently.

5. A multicellular organism that has a cell wall made of chitin and obtains nutrients through external digestion is classified as a _____.

Answer: D) Fungus

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Chitin cell walls and absorptive heterotrophy (external digestion) are the defining characteristics of Kingdom Fungi, distinguishing them from plants (cellulose) and animals (no cell wall).

6. True or False: All organisms within the Kingdom Protista are unicellular.

Answer: B) False

While many protists are unicellular, some, like Kelp (large brown algae), are multicellular organisms that do not fit into the Plant, Animal, or Fungi kingdoms.

7. Why did scientists switch from a Five-Kingdom system to a Three-Domain system?

Answer: B) To emphasize differences in ribosomal RNA

Deep genetic analysis showed that Archaea and Bacteria are as different from each other as they are from Eukaryotes, leading to the broader 'Domain' level.

8. In a dichotomous key used to identify trees, the first step usually asks about the _____ of the leaves.

Answer: C) Shape

Dichotomous keys rely on observable, structural characteristics. Leaf shape is a primary physical trait used to divide groups in a binary (two-choice) format.

9. True or False: Organisms in the Kingdom Animalia are autotrophs because they have complex nervous systems.

Answer: B) False

Animals are heterotrophs, meaning they must consume other organisms for energy. Autotrophs (like plants) produce their own food through photosynthesis.

10. Constructing a cladogram requires the identification of 'derived characters.' Which of these is a derived character for birds but NOT for all vertebrates?

Answer: C) The possession of feathers

A derived character is a trait that appeared in the most recent common ancestor of a specific lineage. Feathers are unique to the avian clade, whereas backbones are shared by all vertebrates.