

Name: _____ Date: _____

Answer Key: When Scientific Disciplines Collide: A 10th Grade Cross-Examination

Sophomores analyze interdisciplinary scenarios to distinguish between pure and applied sciences while evaluating the boundaries of modern inquiry.

1. A researcher is studying how the high pressure at the bottom of the Mariana Trench affects the molecular structure of proteins in deep-sea fish. Which two branches of science are primarily being integrated here?

Answer: B) Physics and Biology

This scenario involves 'Biophysics,' combining the study of physical forces (pressure) with biological organisms (protein structures in fish).

2. The study of the chemical composition of rocks to understand the early formation of the Earth's crust is specifically known as _____.

Answer: A) Geochemistry

Geochemistry is the bridge between Earth Science and Chemistry, focusing on the chemical tools used to solve geological problems.

3. Theoretical physics relies more on mathematical modeling and conceptual frameworks than on direct laboratory experimentation.

Answer: A) True

Unlike experimental physics, theoretical physics uses math to develop models that explain or predict natural phenomena, often before they can be tested.

4. If a scientist is investigating the potential for life on Enceladus (a moon of Saturn) by analyzing its subsurface ocean, which specialized field are they practicing?

Answer: B) Astrobiology

Astrobiology is the interdisciplinary study of the origins, evolution, and distribution of life in the universe, combining astronomy and biology.

5. In the hierarchy of science, the study of how energy transformations occur within a closed mechanical system is a core concern of _____.

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Answer: A) Thermodynamics

Thermodynamics is a branch of physics that deals with heat, work, and temperature, and their relation to energy and radiation.

6. Environmental Science is considered an 'applied science' because it uses knowledge from various pure sciences to solve real-world problems.

Answer: A) True

Applied sciences take foundational knowledge (like biology or chemistry) and apply it to practical issues like pollution or conservation.

7. A scientist analyzing the radioactive decay of isotopes within a meteorite to determine the age of the solar system is acting as a(n):

Answer: B) Cosmochemist

Cosmochemistry involves the study of the chemical composition of matter in the universe and the processes that led to those compositions.

8. The branch of Earth Science that focuses specifically on the Earth's atmosphere and the processes that cause weather is _____.

Answer: C) Meteorology

Meteorology is the specific discipline of Earth Science dedicated to atmospheric phenomena and weather forecasting.

9. Organic Chemistry is the study of all chemical compounds, regardless of whether they contain carbon-hydrogen bonds.

Answer: B) False

Organic chemistry specifically focuses on carbon-based compounds; the study of non-carbon compounds is called Inorganic Chemistry.

10. Which field would be most concerned with the ethical implications and biological mechanics of CRISPR gene-editing technology?

Answer: C) Molecular Biology

Molecular biology deals with the structure and function of the macromolecules (like DNA) essential to life, including genetic engineering.

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