

Name: _____ Date: _____

Rigid Logic, Fluid Discoveries: Advanced Scientific Inquiry for College Scholars

Moving beyond linear steps toward scholarly analysis of epistemic humility and the iterative nature of modern experimental design.

1. In the context of the hypothetico-deductive model, what is the primary purpose of attempting to falsify a hypothesis rather than prove it?

- A. To satisfy the requirements of the peer-review process.
- B. Because induction cannot provide absolute certainty, while a single counter-example can disprove a universal claim.
- C. To align with the principles of social constructivism in scientific inquiry.
- D. To minimize the use of statistical power in experimental design.

2. A researcher studying neuroplasticity notices an unexpected correlation between gut microbiota and cognitive performance. This 'accidental' discovery, which leads to a new hypothesis, is an example of _____.

- A. Confirmation bias
- B. Serendipity in science
- C. P-hacking
- D. Double-blind methodology

3. In a robust scientific experiment, the 'null hypothesis' (H₀) assumes that there is no significant relationship or effect between the variables being studied.

- A. True
- B. False

4. Which of the following best describes the role of 'Auxiliary Hypotheses' when an experiment yields results that contradict the main hypothesis?

- A. They are irrelevant to the core scientific method.
- B. They represent the data analysis phase of the investigation.
- C. They are assumptions about equipment or background conditions that might be the actual cause of the discrepancy.
- D. They are the final conclusions published in a primary source.

5. When a researcher ensures that neither the subjects nor the individuals measuring the outcome know which group received the treatment, they are utilizing a _____ design to eliminate observer bias.

- A. Single-blind
- B. Retrospective
- C. Double-blind
- D. Qualitative

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6. In the context of evaluating scientific literature, what defines a 'Paradigm Shift' as described by Thomas Kuhn?

- A. A minor update to a textbook's glossary.
- B. A fundamental change in the basic concepts and experimental practices of a scientific discipline.
- C. The process of moving from a hypothesis to an experiment.
- D. A decrease in the amount of funding available for basic research.

7. A theory is logically equivalent to a hypothesis in the scientific hierarchy; both are equally supported by experimental evidence.

- A. True
- B. False

8. If an experiment is 'reproducible' but not 'replicable,' what does this likely imply about the study?

- A. The data can be analyzed by others with the same result, but new data collection in the same conditions fails to produce the same effect.
- B. The experiment was conducted with a control group.
- C. The hypothesis was proven true via inductive reasoning.
- D. The researcher used too many independent variables.

9. The ethical principle of _____ requires that researchers minimize risks to participants and maximize potential benefits in the design of an experiment.

- A. Justice
- B. Beneficence
- C. Fidelity
- D. Autonomy

10. Peer review is a step in the scientific method that occurs after the conclusion to ensure the validity, originality, and quality of the research before publication.

- A. True
- B. False