

Name: _____ Date: _____

The Researcher's Gambit: A College Guide to Scientific Logic

Scholars apply foundational principles across 10 rigorous items to distinguish between empirical observations, predictive hypotheses, and peer-reviewed syntheses.

1. An epidemiologist notices a cluster of rare infections in a specific urban district. According to the scientific method, which action represents the transition from observation to research?

- A. Drafting a final report for the CDC
- B. Reviewing existing medical literature for similar case studies
- C. Administering experimental vaccines to the population
- D. Publicly declaring a new virus has been discovered

2. A scientific hypothesis must be phrased in a way that allows it to be proven false through empirical testing.

- A. True
- B. False

3. In a controlled experiment investigating the effect of caffeine on cognitive processing speed, the reaction time measured in milliseconds is the _____ variable.

- A. Independent
- B. Controlled
- C. Dependent
- D. Confounding

4. A marine biologist finds that coral bleaching occurs more frequently in areas with high boat traffic. What is the most logical next step for this researcher?

- A. Immediately banning all boats from the area
- B. Formulating a testable hypothesis regarding water acidity or temperature
- C. Ignoring the correlation as irrelevant data
- D. Changing the study to focus on deep-sea fish

5. Which stage of the scientific method is primarily concerned with the use of statistical software to determine if results are significant?

- A. Hypothesis generation
- B. Experimental design
- C. Data analysis
- D. Peer review

6. The primary goal of 'Communication' in the scientific method is to prevent other scientists from replicating the study.

- A. True

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B. False

7. When a researcher states, 'If the soil pH is lowered, then the rate of nitrogen fixation will decrease,' they are performing the step of _____.

- A. Observation
- B. Conclusion
- C. Experimentation
- D. Hypothesizing

8. A psychologist finds that their experimental data does not support their hypothesis. What is the most scientifically sound conclusion to draw?

- A. The experiment was a total failure and should be deleted
- B. The data should be adjusted to fit the hypothesis
- C. The hypothesis was incorrect, providing an opportunity to refine the theory
- D. The study should be published as proving the hypothesis true anyway

9. An experiment should ideally change only one variable at a time to ensure that the results can be attributed to that specific change.

- A. True
- B. False

10. The final step of the scientific method where a researcher synthesizes results and discusses the implications for the broader field is the _____.

- A. Observation
- B. Conclusion
- C. Hypothesis
- D. Question