

Name: _____ Date: _____

Answer Key: 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?

Answer: B) Reviewing existing medical literature for similar case studies

Research involves gathering background information and reviewing previous studies to contextualize the initial observation before forming a hypothesis.

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

Answer: A) True

Falsifiability is a core requirement of the scientific method; if a statement cannot be tested and potentially refuted, it is not a scientific hypothesis.

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

Answer: C) Dependent

The dependent variable is the outcome being measured or observed in response to changes in the independent variable.

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?

Answer: B) Formulating a testable hypothesis regarding water acidity or temperature

After identifying a pattern or question through observation, the scientist must develop a testable explanation (hypothesis) to investigate the cause.

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

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Answer: C) Data analysis

Data analysis involves examining the collected information, often using statistics, to see if the hypothesis is supported by the evidence.

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

Answer: B) False

Communication is intended to share findings so that others can critique, verify, and replicate the work to build scientific knowledge.

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 _____.

Answer: D) Hypothesizing

A hypothesis is a predictive 'if-then' statement that suggests a relationship between variables.

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

Answer: C) The hypothesis was incorrect, providing an opportunity to refine the theory

In science, refuting a hypothesis is a valuable result that leads to new questions and more accurate theories.

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

Answer: A) True

Controlling variables is essential for internal validity, allowing the researcher to isolate the effect of the independent variable.

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

Answer: B) Conclusion

The conclusion summarizes the findings, explains whether the hypothesis was supported, and connects the work back to the original question.