

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Answer Key: The Forensic Investigator's Seventh Grade Inquiry Expedition

Aspiring scientists apply rigorous experimental design and variable control across 10 challenges modeled after real-life laboratory and field research scenarios.

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**1. A marine biologist notices that coral bleaching is more prevalent in areas with high boat traffic. Before designing an experiment, which step is essential to ensure the study is grounded in existing scientific knowledge?**

**Answer:** B) Conducting a literature review of peer-reviewed studies on coral stressors.

Researching existing literature is a critical step of the scientific method that prevents redundant work and helps refine the hypothesis based on what is already known.

**2. In a controlled experiment testing how different wavelengths of light affect the rate of photosynthesis in Elodea plants, the 'rate of photosynthesis' represents the \_\_\_\_.**

**Answer:** C) Dependent Variable

The dependent variable is the factor being measured or observed; it 'depends' on the changes made to the independent variable (the light wavelengths).

**3. If an experiment's data does not support the original hypothesis, the entire investigation is considered a failure and the data should be discarded.**

**Answer:** B) False

Refuting a hypothesis is a valid scientific outcome. It provides evidence that a specific relationship does not exist, leading to new questions and refined hypotheses.

**4. Which of the following is the most scientifically sound hypothesis regarding the effect of urban noise on avian communication?**

**Answer:** C) If ambient noise levels increase, then city birds will sing at higher frequencies to be heard.

A strong hypothesis uses an 'If... then...' structure and identifies a specific, testable relationship between variables.

**5. To ensure that the results of a study on soil pH and earthworm activity are caused only by the pH levels, a scientist must keep the soil moisture and temperature \_\_\_\_.**

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Answer:** D) Constant

Constants are conditions kept the same across all groups to ensure that only the independent variable is responsible for the observed results.

**6. A scientific theory is just an educated guess that has not yet been tested by an experiment.**

**Answer:** B) False

In science, a 'theory' is a well-substantiated explanation of some aspect of the natural world that is acquired through the scientific method and repeatedly tested and confirmed.

**7. An engineer is testing a new composite material for bridge cables. After three trials, the material snaps earlier than expected. What is the most logical next step in her inquiry?**

**Answer:** B) Analyze the breaking points to identify a pattern and revise the design.

Data analysis and iterative design are core to the scientific method; unexpected results are used to refine the process and improve understanding.

**8. A researcher is studying the efficacy of a new vaccine. Group A receives the vaccine, while Group B receives a saline injection (placebo). Group B serves as the \_\_\_\_\_.**

**Answer:** B) Control Group

The control group provides a baseline for comparison, allowing researchers to see if the independent variable (the vaccine) actually causes a different outcome.

**9. Quantitative data involves numerical measurements, while qualitative data involves descriptive observations.**

**Answer:** A) True

Quantitative data (quantities) uses numbers and units, whereas qualitative data (qualities) describes characteristics like color, texture, or behavior.

**10. Why is 'Communication' considered a final but continuous step in the scientific method?**

**Answer:** B) To allow for peer review and the replication of results by other scientists.

Peer review and replication are the 'checks and balances' of science, ensuring that findings are accurate and that the methodology was sound.