

Experimental Design, Uncertainty, and Evidence Quality

Student Worksheet | g10_u09_w34

I can: identify variables, calculate simple summary statistics, and evaluate the quality and limit of fictional evidence.

Scope card: This is a paper-only planning and data-analysis model. The response-index values are fictional and already supplied; students must not collect data, handle materials, or perform a procedure. The cards support reasoning about this printed comparison only. They do *not* establish a real chemical effect, laboratory safety, accuracy against a reference, health claim, product choice, or action recommendation.

printed condition label	response index, trial 1	trial 2	trial 3
L	12.1	12.3	12.2
H	15.0	15.2	14.8

Planning/data card: The intended independent variable is the L/H label; the dependent variable is the fictional response index. A planning model holds the printed data-card format and three-trial count constant. Values are reported to 0.1 index unit; for this worksheet use reporting uncertainty of ± 0.05 index unit for a reported mean. No accepted/reference value is supplied.

1. Identify the intended independent variable.

2. Identify the dependent variable.

3. Name one printed control or constant in the planning model.

4. Why is this card a planning/data-analysis model rather than an instruction to perform a real procedure?

5. Calculate the mean response index for L.

6. Calculate the range for L.

7. Calculate the mean response index for H.

8. Calculate the range for H.

9. Calculate the difference between the H and L means.

10. Which condition has the smaller range, and what does that indicate about this three-trial precision comparison?

11. Can this card determine accuracy? Explain using the accepted/reference-value boundary.

12. What evidence pattern would be more consistent with random variation than with a constant offset?

13. Why are three repeated entries useful even though they do not prove a conclusion?

14. State one possible source of uncertainty that is *not* quantified by the fictional card.

15. State the reporting uncertainty assigned to a printed mean.

16. Write the L mean as a value with its assigned reporting uncertainty.

17. Critique: "Because H has a higher mean, the card proves a real chemical cause in every setting."

18. Critique: "Three repeated values prove that the data are accurate and the procedure is safe."

19. Write a low-risk planning claim that names the independent variable, dependent variable, one constant, and one evidence-quality limit. Do not give a physical procedure.

20. Write a cautious CER about the printed L/H comparison using two values, one precision or uncertainty idea, and one boundary on the conclusion.
