Year 11 Science: Five investigative approaches and the question each one answers

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Which approach best answers: which of the beetles caught in pitfall traps in the school bush are native?

2. Which approach best answers: do kererū visit gardens more often in the months when more trees are fruiting?

3. A student tests whether the slope of a tray of soil changes how much soil washes off when 500 mL of water is poured over it. Name the independent variable, the dependent variable and one controlled variable.

4. Explain why modelling, not a fair test, is the right approach for predicting how a 1 m rise in sea level would affect a coastal town.

5. A student wrote: 'Exploring and observing was appropriate because we explored and observed the stream.' Say why this is not yet Merit, and what it needs.

Fix the mistake

6. Correct this statement: "Every investigation is a fair test, so each one needs an independent and a dependent variable."

7. Correct this statement: "The graph shows pH falling as CO_2 rises, so this proves CO_2 causes it."

8. Correct this statement: "Pattern seeking was appropriate because we were looking for patterns."

9. Correct this statement: "Surveys and things said at a wānanga are not real science, so I left them out."

Answer key (for parents and tutors)

1. Which approach best answers: which of the beetles caught in pitfall traps in the school bush are native?
   Classifying and identifying: each beetle is named with a key or guide and sorted into native or introduced.
2. Which approach best answers: do kererū visit gardens more often in the months when more trees are fruiting?
   Pattern seeking: the number of visits and the amount of fruit both vary on their own and cannot be controlled, so you look for a link across many months.
3. A student tests whether the slope of a tray of soil changes how much soil washes off when 500 mL of water is poured over it. Name the independent variable, the dependent variable and one controlled variable.
   Independent: the slope (angle) of the tray. Dependent: the amount (mass) of soil washed off. Controlled, for example: the 500 mL of water, how fast it is poured, the type and amount of soil.
4. Explain why modelling, not a fair test, is the right approach for predicting how a 1 m rise in sea level would affect a coastal town.
   The sea cannot be raised to test it, and the change is too big and too far in the future, so a model (a map or computer model of the town and its land heights) is used to predict it.
5. A student wrote: 'Exploring and observing was appropriate because we explored and observed the stream.' Say why this is not yet Merit, and what it needs.
   It only repeats the approach's name; it needs a reason the approach suited the question, backed by evidence from the investigation, such as what was found and measured on the visit.
6. Correct this statement: "Every investigation is a fair test, so each one needs an independent and a dependent variable."
   Only fair testing changes one variable on purpose; the other four approaches answer different kinds of question.
7. Correct this statement: "The graph shows pH falling as CO_2 rises, so this proves CO_2 causes it."
   A pattern shows a link, not a cause; you need a fair test, a model or known chemistry as well to argue the cause.
8. Correct this statement: "Pattern seeking was appropriate because we were looking for patterns."
   That only repeats the name; give the reason with evidence, such as the ocean cannot be controlled, so 23 years of measured data was the only way to see the trend.
9. Correct this statement: "Surveys and things said at a wānanga are not real science, so I left them out."
   Surveys, statistics and wider knowledge, including mātauranga shared at a wānanga, all count as evidence when used with care and acknowledged.