Observations and Experiments

Observations

- Observations are one way to test hypotheses. This data collection is done when an experiment is not practical, or not morally correct.

Study Tip

It's important to note that experimental errors are *unavoidable*. These are not predictable and are not always human mistakes.

Experiments

- **Experiments** are another way to test hypotheses. An experiment is a test that is performed in controlled conditions, usually in a field or lab.
- In experiments, only one factor changes. All other factors stay the same.
    - The **independent variable** is the factor that changes.
    - The **dependent variable** is the resulting factor that depends on the independent variable.

Scientists use satellites, since it is not practical for them to see Jupiter directly.

- In experiments, there must be a **control group**. The control group does not have the independent variable's influence. This way, scientists can see the affect of the independent

Experimental Error

- Scientists make unavoidable errors when taking measurements. These are **experimental errors**.
    - **Systematic errors** are errors due to some problem in the system. Results are always skewed in one direction.
    - **Random errors** are mistakes made by the person performing the experiment or from an event that occurs for no apparent reason. Measurements are usually averaged to minimize random errors.
- If one data point is extremely inconsistent from other samples, it is likely that a mistake was made. The inconsistent data point can be thrown out.

Concept Check

- What are two ways to test hypotheses?
- Why do scientists use observations?
- What is the independent and dependent variable?
- What is the control group? What is it used for?
- What are two types of experimental errors?