

SCIENCE PROCESS SKILLS

- Observing
- Inferring
- Predicting
- Making Models
- Classifying
- Evaluating

Observation – the action or process of observing (perceiving) something or someone to gain Information

Scientific Observation

- the act of using one or more of the five senses to gather information about an object, event, or phenomenon in a careful, systematic, and unbiased way.

	Simple Observation	Scientific Observation
Purpose & Focus	Accidental or Casual	Intentional and focused
Tools	Rely entirely on unaided human senses.	Uses calibrated instruments to bypass human bias and error.
Data Types	Primarily qualitative	Both qualitative and quantitative. It relies heavily on exact numerical data
Reliability	Subjective and prone to personal bias or memory lapses.	Objective, standardized, and repeatable. Other researchers should be able to make the exact same observation under the same conditions.

Characteristics of Scientific Observation

Objective:

Free from personal opinion. Reports only what is actually detected - no feelings, assumptions, or bias

Accurate:

As close to the truth as possible. Use senses carefully and, when needed, instruments like rulers and thermometers for precision.

Relevant:

Directly related to the research question. Only observations that help answer the research question are kept. Off-topic details, even if true, are set aside.

Repeatable:

Others get the same result. Any person following the same method should arrive at the same observation — this makes science reliable and trustworthy.

Examples:

Simple Observation	Scientific Observation
The water is clear.	The water is colorless, transparent, and has no visible particles or sediments.
The apple is red and looks nice.	The apple has a red skin with a smooth surface, and no visible bruises or cuts.
The plant looks healthy.	The plant has green leaves with firm stems, and no visible signs of pests or discoloration.

Types of Observation based on the nature of data.

- Qualitative Observations (Descriptive)
 - Describes qualities using words; detected with senses.
 - helps describe what something looks, feels, or behavesExamples:
 1. The leaves of the plants in sunlight are broader.
 2. The pots are made of clay.
- Quantitative Observations (Numerical)
 - Uses numbers and measurements; recorded with instruments.
 - Use instruments (rulers, thermometers) to extend what senses can detect accurately.
 - provides exact measurements or countsExamples:
 1. The plants exposed to sunlight grew 15cm tall in 1 week.
 2. Each pot contains 500 mL of soil.

Types of Observation based on usefulness in answering the research question.

- Relevant Observations (Useful)
 - helps answer the research question
 - provides information related to the purpose of the investigation
- Irrelevant Observations (Not Useful)
 - do not help answer the research question
 - information is not related to the purpose of the investigation

Examples:

Research Question:

Does sunlight affect the growth of mung bean plants?

Does sunlight affect the growth of mung bean plants?		
1	✓	Plants in sunlight grew 15 cm tall after 1 week.
2	✓	Leaves of sunlight plants are broader and deeper green.
3	X	The pots are made of clay.
4	X	The teacher wrote the date on the board.

Careful, repeated observations, and comparing them are how science explains how the world works.

In observing, we consider similarities, differences, and unusual or strange patterns.

- Similarities – characteristics or features that are alike between two or more objects, events, or situations.
- Differences – characteristics or features that make objects, events, or situations unlike one another.
- Strange (Unusual Patterns) – observations that do not fit the expected pattern or seem different from what is normally observed; these often lead to new questions and investigations.

Example: Observing plants

Similarity: All plants have green leaves.

Difference: One plant is taller than the others.

Strange Pattern: One plant's leaves are turning yellow while the others remain green.

