

LIFE & PHYSICAL SCIENCE

Introduction & Scientific Method

What is Life & Physical Science?

- **Life Science:**

- the study of living things; biology.

- **Physical Science:**

- The study of matter, non-living materials; physics, chemistry.
- Includes earth science.

Earth science is the name for the group of sciences that deals with Earth and its neighbors in space.

Scientific Inquiry

- Science assumes that the natural world is
 - Consistent
 - Predictable
- **The goals of science are**
 - To discover patterns in nature
 - To use knowledge to make predictions

Scientific Inquiry

- Science begins with making observations and asking questions.
- Observation is the process of gathering information about events or processes in a careful, orderly way.



Scientific Inquiry

- Observations lead to ideas.
- Ideas can become a **hypothesis**.
 - Hypothesis: a possible explanation for an observation (untested)
- A hypothesis can become a **theory**.
 - Theory: a tested, well supported hypothesis.
- **Scientific Method** is used to develop a hypothesis and test it.

Scientific Method

- Involves a series of steps that are used to investigate a natural occurrence:
 1. Observe things/Ask a question
 2. Form a hypothesis.
 3. Set up a controlled experiment/test hypothesis
 4. Collect data and analyze results
 5. Come up with a conclusion.
 6. Share conclusions/report findings

1. Observe things/Ask a question

- What do you observe in this picture?
- **Inference or conclusion:** based on observations.



1. Observe things/Ask a question

Scientists use data to make inferences.

An **inference** is a logical interpretation based on prior knowledge or experience.

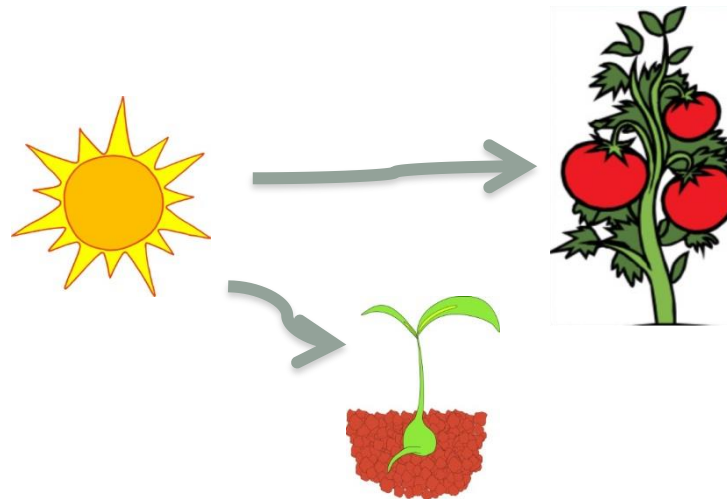


1. Observe things/Ask a question

- Careful observations lead to questions.
- Your question should **compare things**.
 - Do plants in **sun** grow more than plants in the **dark**?

2. Form a hypothesis.

- What we think will happen in the experiment.
- A statement that states the expected answer.
- A hypothesis can be proven right **OR** wrong.
- “If..., then...” statement.
 - **If** we put a plant in the sun, **then** it will grow more.



2. Form a hypothesis.

- How do scientists test hypotheses?
- A hypothesis should be tested by an experiment in which only one thing is changed at a time.

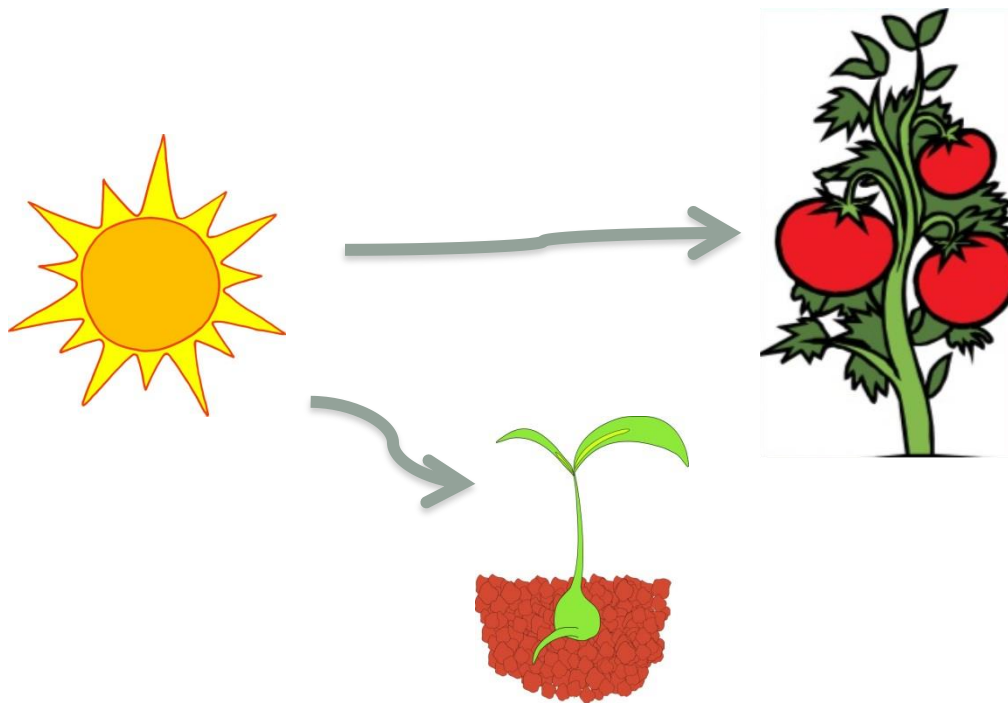


3. Set up an experiment

- Tests the hypothesis to answer your question.
- A variable is something that changes.
- 2 types of variables:
 - Dependent = value changes depending on other factors; value is NOT known at the beginning of the experiment.
 - Independent = we change, manipulate; value is known at the beginning of the experiment.

Variables, Example

- Growth of Plants: does more sun make a difference?
- 8 hours of sun vs. 4 hours of sun. Which plant will grow more quickly?



Independent Variable
= amount of sun.

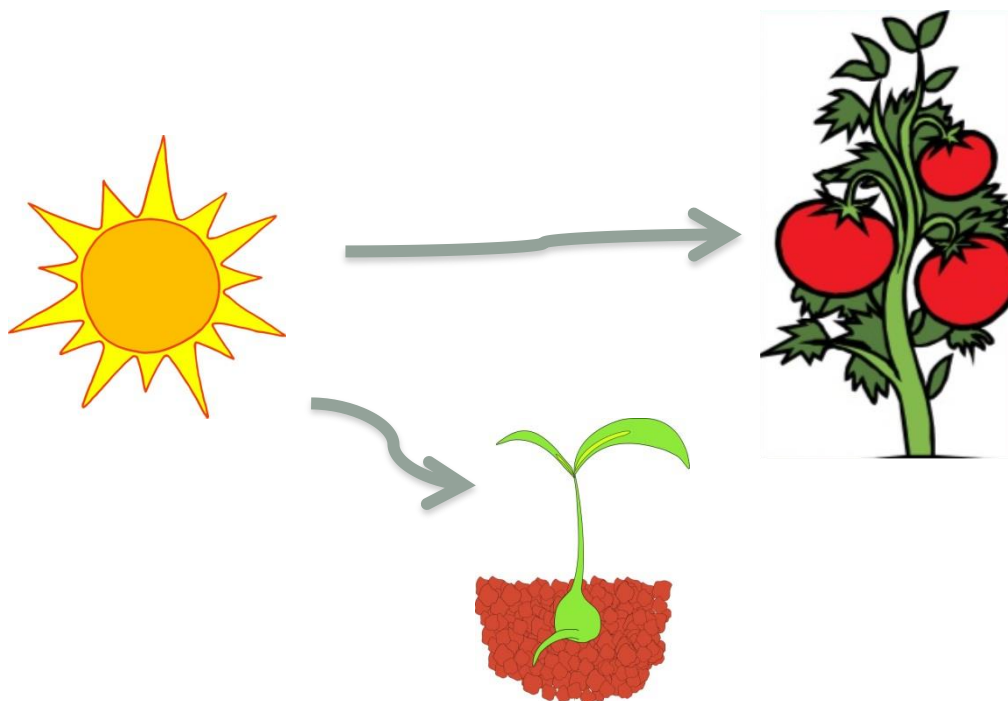
Dependent Variable
= growth of plant.

Controls

- A control is something that is kept constant.
- Controls are kept the same through the experiment:
 - What can we control in our plant growth experiment?
- **Controlled Experiment: tests only 1 variable.**
 - Why is this important?

4. Collect and Analyze Results

- The information gathered from observations is called data.
 1. **Quantitative data** (can be measured/#s)
 2. **Qualitative data** (can't be measured/descriptions)



Quantitative:

Qualitative:

5 & 6. Conclude; Share your results

- Present findings of the experiment.
- Was your hypothesis right? wrong?
 - Does the amount of light a plant gets help it to grow more?
- If hypothesis is wrong, a new one can be stated and tested.