

## The Scientific Method Notes

**Observation alone** is a useful tool in science. Often, a controlled experiment is not possible and observations serve a valuable purpose.

**Scientific Method** – a series of steps a scientist uses to design a controlled experiment to answer a particular question

### The Scientific Method

Ask a Question

Make Observations

Form a Hypothesis - a possible explanation

Design an Experiment to test the Hypothesis

Title - The Effect of Independent Variable (IV) on Dependent Variable (DV)

- Experiment
- Independent Variable/manipulated variable
  - Dependent Variable/responding variable
  - Control/group unaffected by IV/ comparison trial(s)
  - Experimental group/group affected by IV
  - Constants/factors that remain the same for both experimental and control groups
  - Repeated trials when possible to ensure validity of data

Analyze data

Conclusion - do you see patterns in the data? does it support your hypothesis? What factors may have affected your data?

Communicate Results

### Example scenario:

A gardener wants to know what the optimum amount of fertilizer for grass is. Based on prior observations, he suspects that 10 g of fertilizer will provide ideal nutrients. He creates several plots of grass using the same kind of soil and the same kind of containers. He uses different amounts of fertilizer (5g, 10g, 15g, 20g, 25g, 30g, 35g, 40g, 45g, 50g) for each plot except one. On the one plot he uses no fertilizer (0g). He keeps the same amount of sunlight, same amount of water, how often watered and the same temperature for all of the plots. At the end of each two days he measures the height of the grass.

Independent Variable? Amount of fertilizer

Dependent Variable? Height of Grass

Title? The Effect of Amount of Fertilizer on Grass Height

Hypothesis? If Grass is exposed to 10 g of fertilizer, then it will grow tallest

Control? Plot with no fertilizer

Constants? Type of grass, amount of water, temperature, frequency of watering, amount of sunlight, etc.