Unit 1: Scientific Method
The Scientific Method involves a series of steps that are used to investigate a natural occurrence.
Steps of the Scientific Method

1. **Problem/Question**: Develop a question or problem that can be solved through experimentation.

   Ex: Why do some loaves rise higher than others?
Steps of the Scientific Method

2. Observation/Research: Find out more!

Observation (def) is anything you can determine w/your 5 senses.

I observe some loaves rising higher than others.
3. **Formulate a Hypothesis**: Predict a possible answer to the problem or question.

Example: If more sugar is added, then the bread will rise higher.
Hypothesis

• shows the relationship between the independent ("x") and dependent ("y") variables.

Ex: “If more sugar is added, then the bread will rise higher.”
Independent Variable

• Also called the *manipulated variable*.

• the factor that’s *changed on purpose* by the experimenter

  • *(x variable.)*

Ex: John is going to use 25g., 50g., 100g., 250g., 500g. of sugar in his experiment.
Dependent Variable

• Also called the responding variable,

• the factor that may change as a result of changes made in the independent variable.

• This is the “y” variable

Ex: In this case, it would be the size of the loaf of bread.
Steps of the Scientific Method

4. **Experiment**: Develop and follow a procedure to test your hypothesis.
Terms Used in Experiments: Constants

• (definition) all the factors that the experimenter attempts to keep the same.

This allows you to see the real effect of the IV on your DV!
Examples of Constants

(Don’t copy)

• Other ingredients
  • oven used,
  • rise time,
• brand of ingredients,
  • cooking time,
• type of pan used,
• air temperature & humidity where bread was rising,
  • oven temperature,
• age of the yeast…
Terms Used in Experiments: Control Group

- (definition) the group that serves as the standard of comparison.
- the control is often the “usual” case.

Don’t Copy: Ex: bread made following the regular bread recipe is the control group. (Because his grandmother always used 50g. of sugar in her recipe, John is going to use that amount in his control group.)

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Terms Used in Experiments: Trials

- (definition) groups that are exposed to the same conditions in an experiment.
- Ex: John is going to test each sugar variable 3 times.
Terms Used in Experiments: Bias

• (definition) the tendency in setting the conditions of an experiment to favor one particular result

(Don’t Copy) Example: I don’t want my eyesight to be worse than it used to be, so I try to select the lens that seems to be the least strong!
Steps of the Scientific Method

5. **Collect Data and Analyze Results:**

   • Include tables, graphs, and photographs.
   • Modify procedure if needed.
   • Confirm results by retesting.
Collect Data & Analyze Results (cont.)

- When you collect data, **OBSERVATIONS** can be:
  - **Quantitative** - involves a number
    - Ex: 4 mL
  - **Qualitative** – does not involve a number
    - Ex: the fluid turned orange
Steps of the Scientific Method

6. **Conclusion:**

- Include a statement that accepts or rejects the hypothesis.
- Make recommendations for further study & possible improvements to the procedure.
General Layout for an Experimental Design Diagram

TITLE
The Effect of ________________ (Independent Variable) on ________________ (Dependent Variables)

HYPOTHESIS
If ________________ (planned change in independent variable),
then ________________ (predicted change in dependent variables).

INDEPENDENT VARIABLE

_______________

LEVELS OF INDEPENDENT VARIABLE AND NUMBERS OF REPEATED TRIALS

<table>
<thead>
<tr>
<th>Level 1 (Control)</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of trials</td>
<td>Number of trials</td>
<td>Number of trials</td>
<td>Number of trials</td>
</tr>
</tbody>
</table>

DEPENDENT VARIABLE AND HOW MEASURED

__________________________________________

CONSTANTS

1. 

2. 

3. 

4.