

Scientific Method

What is the Scientific Method?

- The **scientific method** is a logical, problem solving technique.

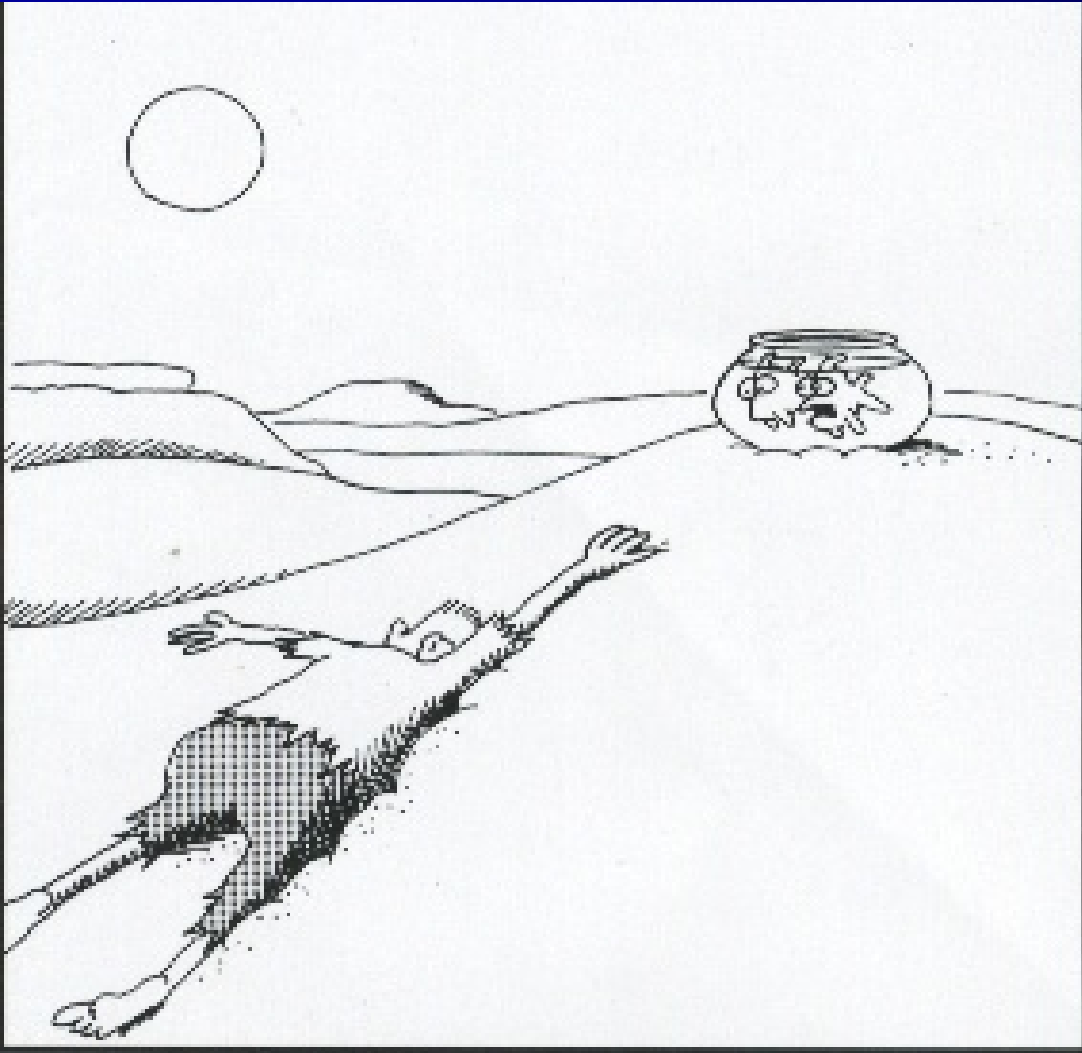
Steps of the Scientific Method

- Observation
- Problem Statement
- Hypothesis Statement
- Experiment / Data Collection
- Conclusion Statement

Observation

- The scientific method begins with **observation**.
- An **observation** is a visible or provable **fact**.
- An *inference* is an **opinion**, or conclusion, based on observed facts.

Observation vs. Inference



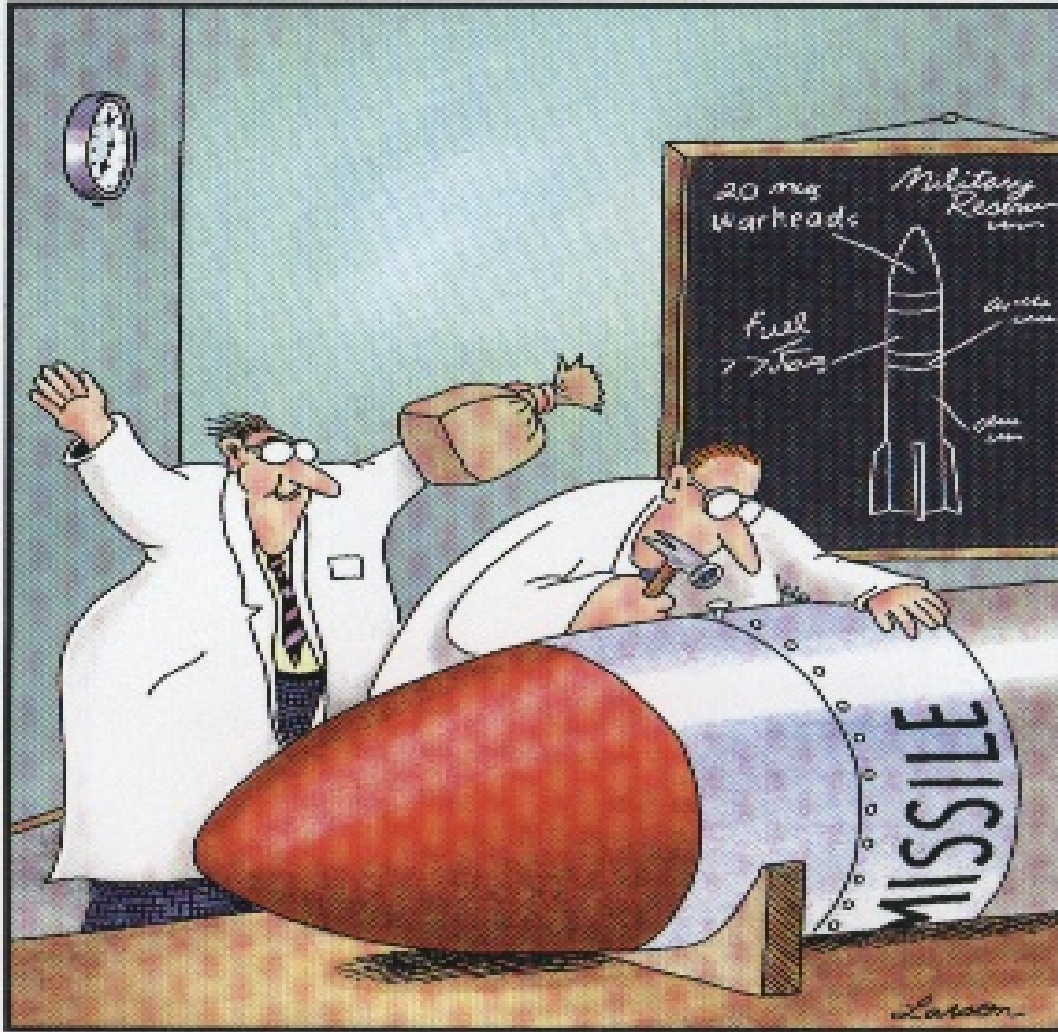
“My word! ... That one came just too close for comfort, if you ask me.”

Observation:

Observation:

Inference:

Observation vs. Inference



Observation:

Observation:

Inference:

Problem Statement

- Careful observations lead to questions that arise.
- A **problem statement** is a question that compares *variables*.
 - *Example*: Does the drop height affect the bounce height of a superball?

What are Variables?

- A **variable** is something that changes.
 - There are independent variables and dependent variables.

What is an Independent Variable?

An independent variable is a variable that changes unrelated to other factors; a variable we manipulate, or change, on purpose.

An independent variable is the variable whose value we know before we start an experiment.

Example: Does the drop height affect the *bounce height* of a superball?

We know the drop heights we will use.

What is a Dependent Variable?

A **dependent variable** is a variable that changes depending on some other factors; the variable we are trying to find out.

The **dependent variable** is the variable whose value we do not know before we start an experiment.

Example: Does the drop height affect the **bounce height** of a superball?

*We do not know the **bounce heights** before we start.*

What is a Constant?

A **constant** is a variable that does not change for the duration of an experiment; a value that remains the same.

Example: Does the drop height affect the bounce height of a **superball**?

The **superball** does not change during the experiment.

Hypothesis Statement

- A hypothesis statement is a statement that expresses the expected answer to the problem statement;
 - what you think the results of the experiment will show.
- *Example:* If a superball is dropped from increasing heights then the bounce heights will also increase because...

Experiment

- An **experiment** is a planned way to test a hypothesis and find out the answer to the problem statement.
- An **experiment** is a way to collect data and determine the value of the dependent variable.
- An **experiment** compares the independent variable to the dependent variable.
- An **experiment** can only test one dependent variable at a time.

Conclusion Statement

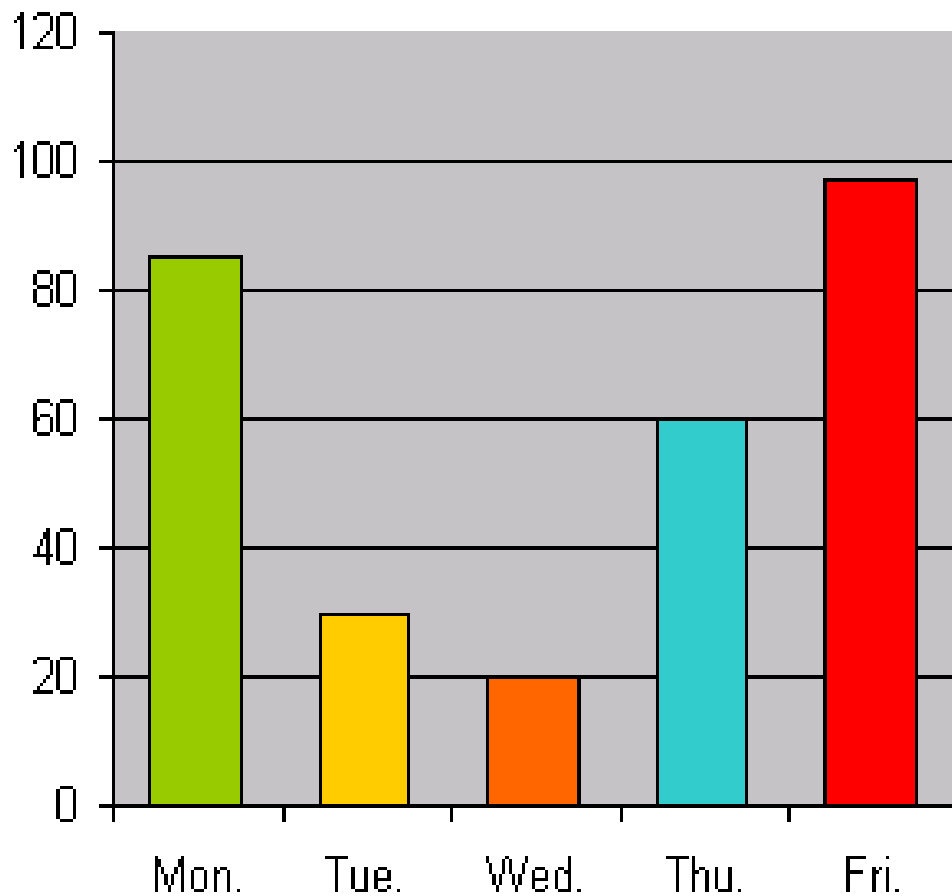
- A **conclusion statement** is a statement that presents the findings of the experiment, what the data shows, and states if the hypothesis was correct (supported) or incorrect (negated).

Why Do We Use Graphs?

- Graphs help us visualize numerical data.
- There are several different types of graphs:
 - Bar graphs
 - Pie graphs
 - Line graphs

Bar Graphs

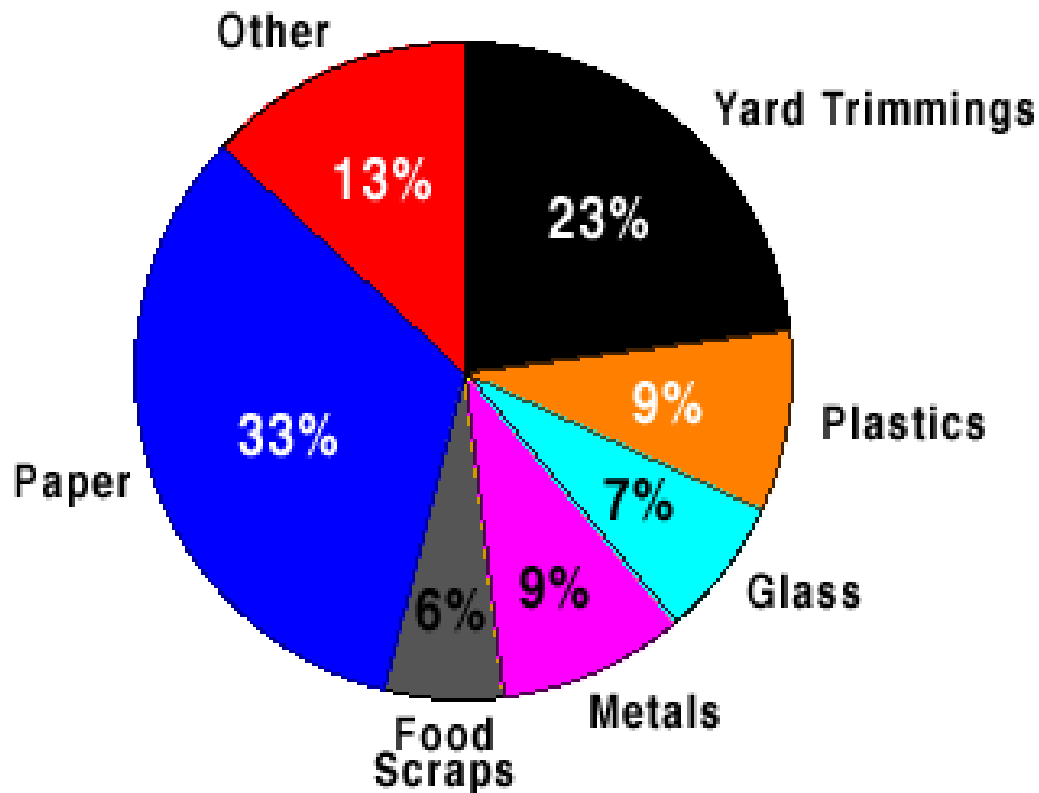
Absences at City H.S.



- Bar graphs are used to show a comparison of multiple objects.

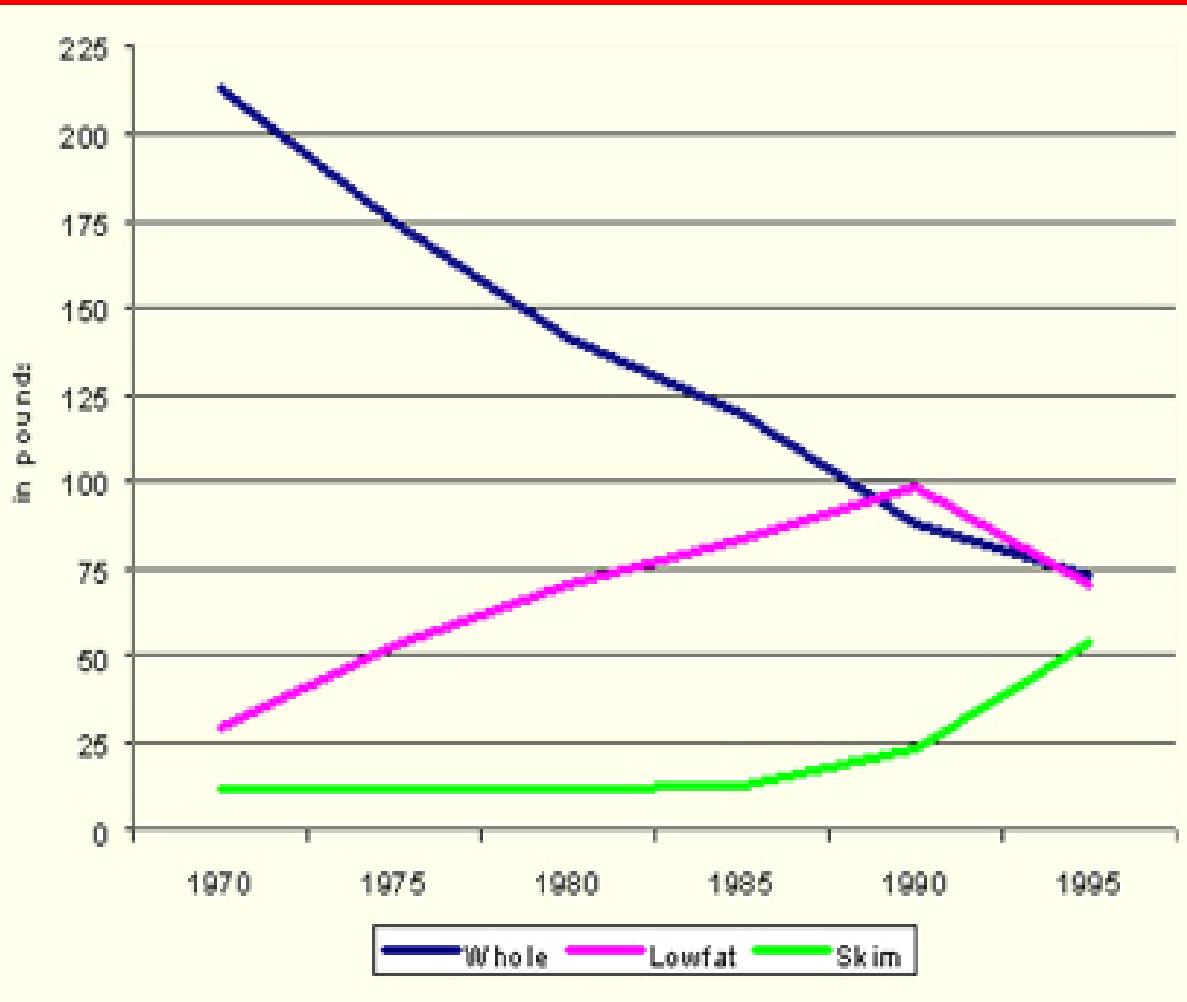
Pie Graphs

Norman Trash



- Pie graphs are used to compare the parts of a whole.

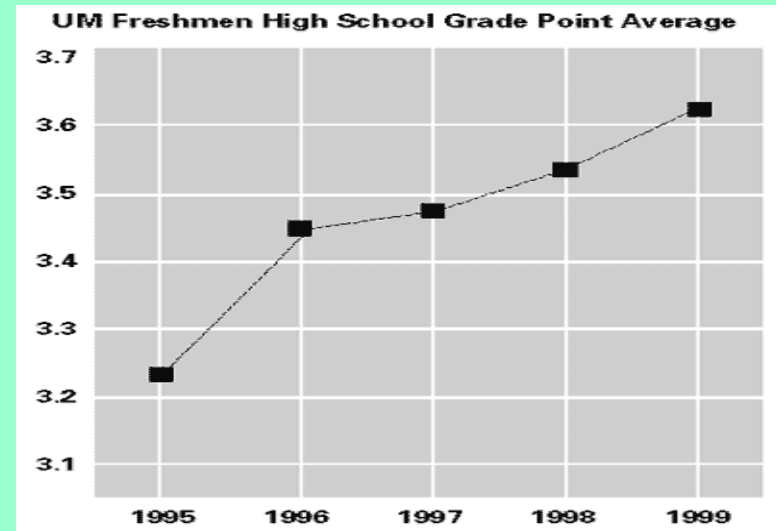
Line Graphs



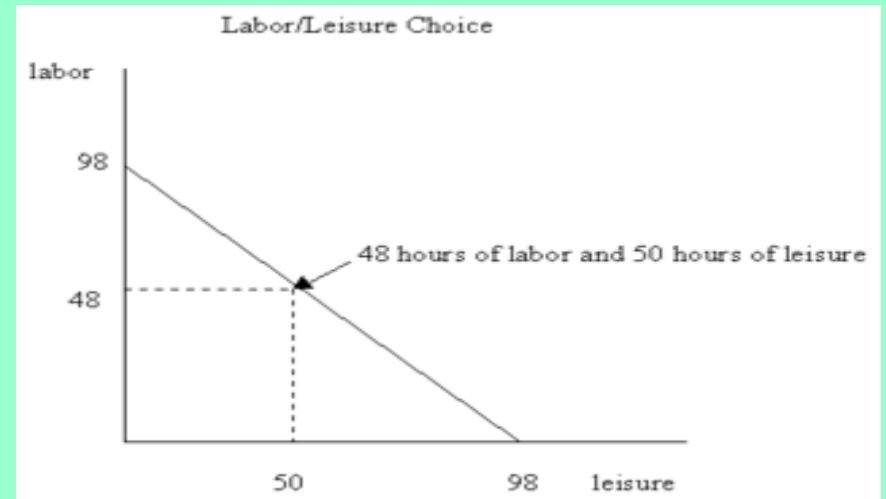
Line graphs are used to show the relationship between variables.

Types of Relationships (between variables)

Direct: as x increases
y increases



Indirect: as x increases
y decreases



Constant: as x increases
y remains the same

