

SCIENTIFIC METHOD

Chapter 1

What is science ?????

- **Science** is the study of natural events through observation and experimentation resulting in an organized body of knowledge.

SCIENTIFIC METHOD (EXPERIMENTAL RESEARCH DESIGN)

- Series of steps to follow in order to solve a problem in science. **Steps are as follows:**
 1. Identify the problem
 2. Gather data
 3. Form a hypothesis
 4. Test your hypothesis
 5. Analyze your results
 6. Draw a conclusion

Identify the problem

- Should be stated in the form of a question.
- The goal of the experiment should be to find the answer to your questions (problem).
- Ask yourself: What is it you want to know?

Ways to gather data -

Make observations - use all
of your senses

Data tables

Charts

Graphs

Scientific Journal - record observations

Take measurements - a way to describe the world with numbers. Measurements must be accurate in order to remove bias.

Models -Used to show items too small to easily, too expensive, too large, too dangerous, etc.

Hypothesis

- A prediction or statement that can be tested through experimentation. **MUST BE TESTABLE**. Should attempt to solve your problem.
- Begin your hypothesis with **“I think”** or **“We predict”**.
- A **hypothesis** is different from an inference. A hypothesis is a prediction that must be testable, but an inference is a prediction, but is NOT testable through experimentation.

Test your hypothesis - by performing an experiment

- Experiments should be performed the same way each time and they should be repeated to test for consistency and accuracy.
- Parts of a good experiment include: **It must be a testable problem**
 - * Two groups in every good experiment -
 - * 1. **Variable / Experimental group** - independent variable is applied to this group. (Variable - factor being tested)
 - * 2. **Control group** - standard for comparison.
 - * **Independent Variable** - variable changed, graphed on the X-axis (horizontal axis). Variable controlled by the person performing the experiment. It begins with the letter I - it is what "I" the experimenter change between the control group and the variable group.
 - * **Dependent Variable** - factor being measured, graphed on the Y-axis (vertical axis). What happens as a result of the independent variable being applied - results.

VERY IMPORTANT

- A well planned experiment has only **ONE** variable at a time. WHY????
 - ◆ If you change more than one variable at a time, you can't be sure which variable caused you to get your results.

Analyze your Results

- Look over your results
- What do they mean?

Based on your experiment come up with a conclusion

- Was your hypothesis correct? incorrect?
- Make a statement saying so

Scientific Results

- No matter what the research results, it is important to communicate the results to others to further the advancement of technology, health, and many other areas.
- **Technology** - is the application of science to make products or tools that people can use.

Descriptive Research

- **Descriptive Research** - used to investigate problems when it is impossible to perform experiments.
- **Example:** Determining the origin of a disease.

Gravity

Gravity – an attractive force between 2 objects that have mass

The greater the distance from the sun = less force of gravity

The greater the mass = greater the pull of gravity (EX: Jupiter and Saturn are large planets)

Mercury is small and has smaller mass than Venus but Mercury's distance to the Sun is shorter than that of Venus. Mercury experiences a stronger gravitational pull than Venus. Venus is closer to the Sun than Earth is and experiences a stronger gravitational pull than Earth does.
(Venus & Earth are about the same size (Earth's twin))

YOUR ASSIGNMENT

- Come up with an experiment to prove or disprove the effect of gravity
- Fill in lab report provided
- You can use cars and /or balls provided
- You will present your experiment and findings with the class on Monday / Tuesday

How to use the balances?

- We will practice using them prior to doing this project