P. Sci.

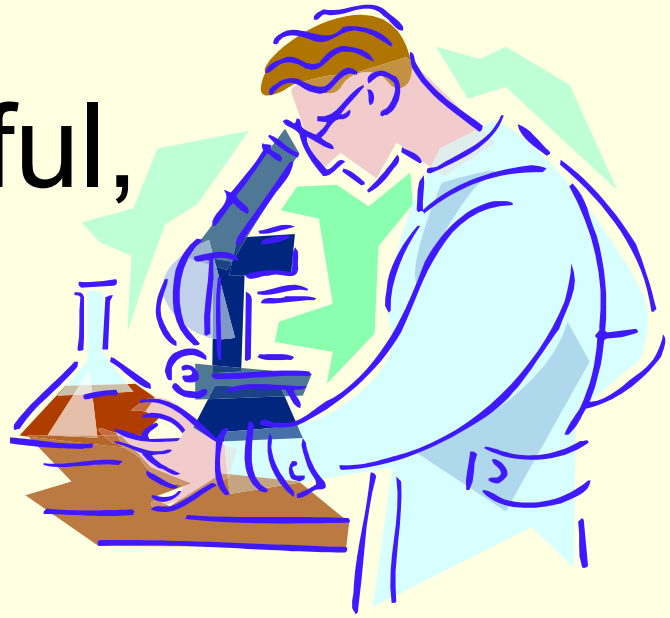
Unit 1

Introduction

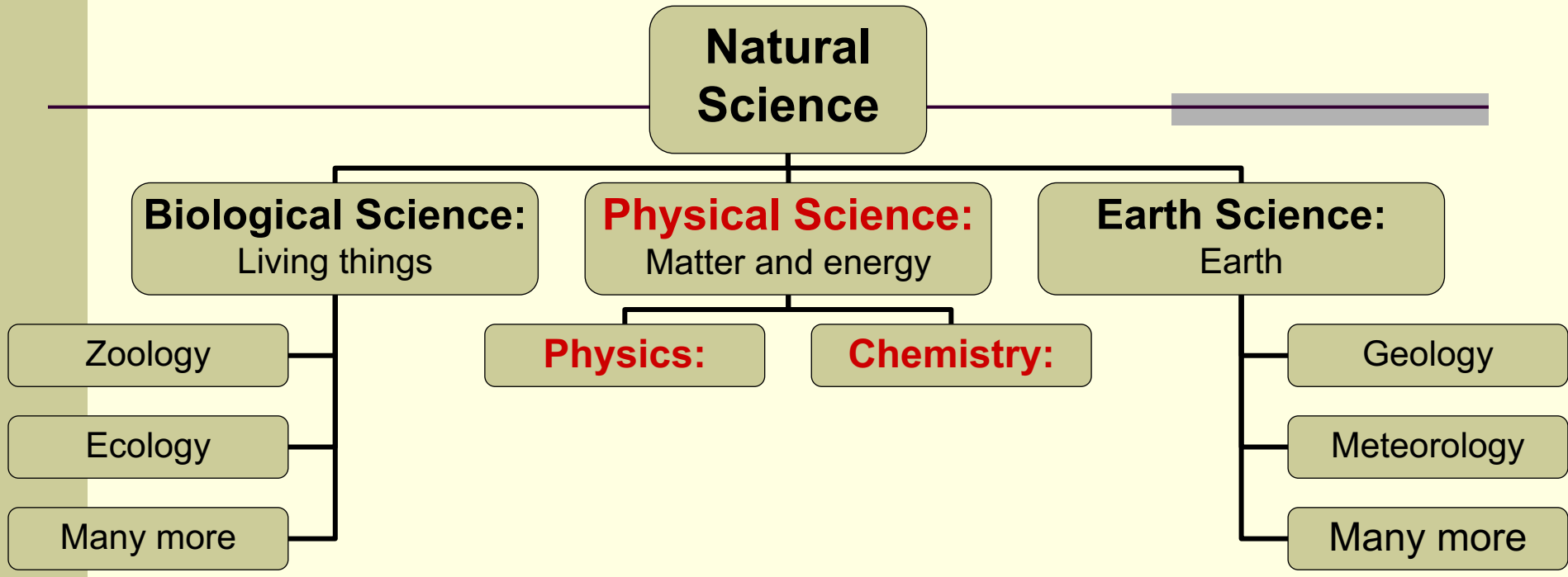
Chapter 1

What is Science?

- Generally scientists believe that the universe can be described by basic rules and these rules can be discovered by careful, methodical study.



Branches of Science

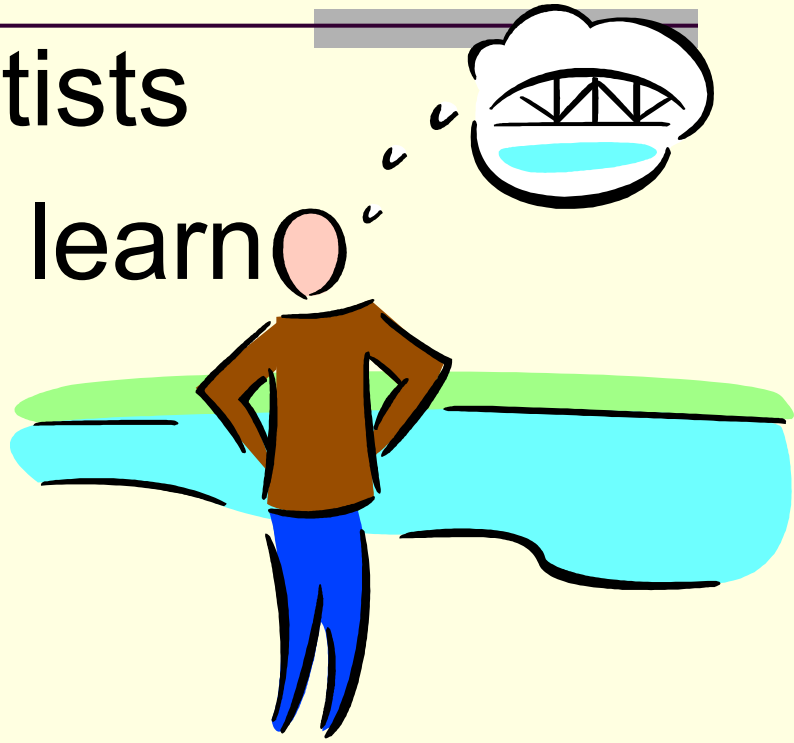


Physics: The study of Forces and Energy

Chemistry: The study of Matter and its changes

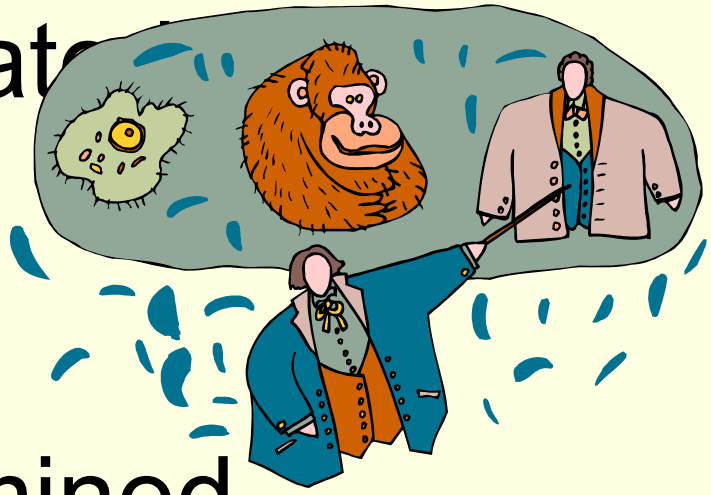
Pure Science vs Technology

- Pure Science - Scientists who do experiments to learn more about the world.
- Technology – the application of science (usually by engineers who look for ways to use the science)



Scientific Theory

- Is an explanation that has been tested by repeated observations.
- Are always being questioned and examined.
- To be valid, a theory must continue to pass each test.

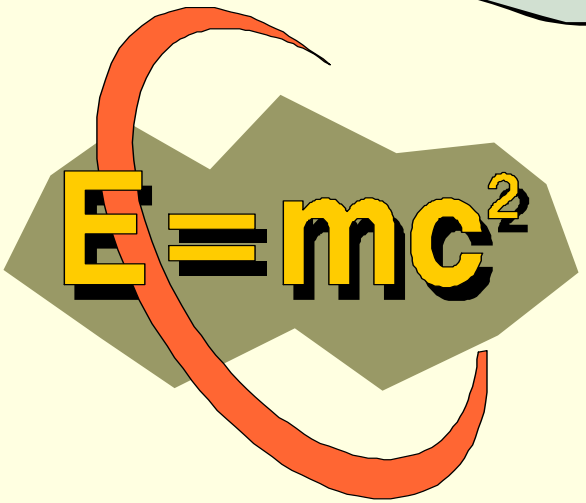


Scientific Theory (cont.)

- A theory must explain observations simply and clearly.
- Experiments that illustrate the theory must be repeatable.
- You must be able to predict from the theory

Scientific Law

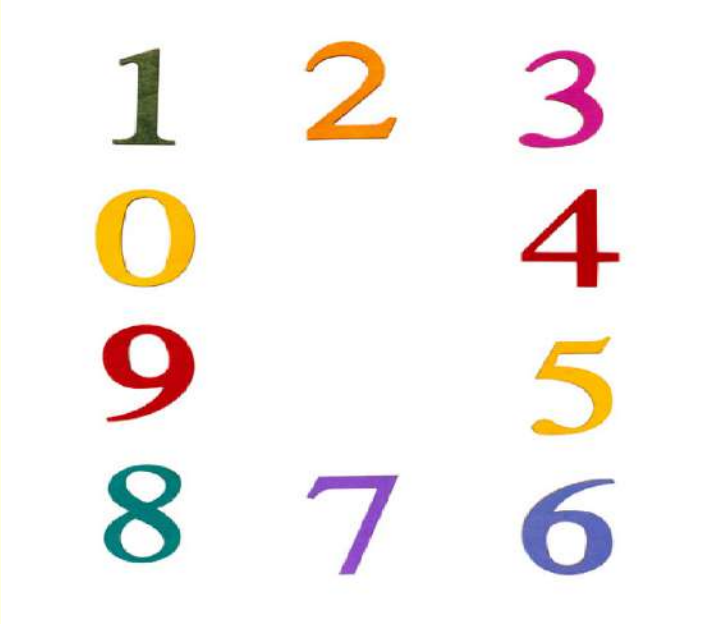
- States a repeated observation about nature.
- Does **not** explain why an event happens.



Theories and Laws are not absolute

- Sometimes theories or Laws have to be changed or replaced completely <u>when new discoveries are made.</u>

Qualitative vs Quantitative



- Qualitative – describes with words.
- Quantitative – stated as mathematical equations.

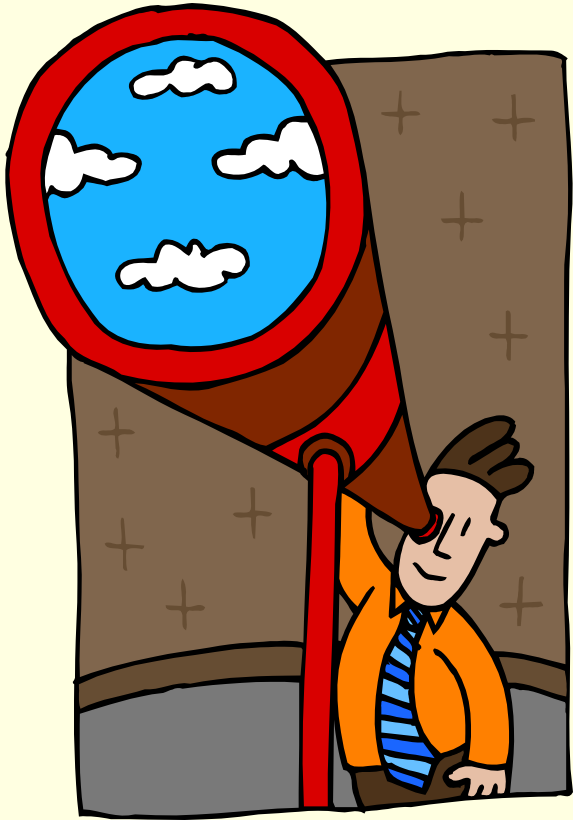
Science Skills

- Planning Experiments
  - Critical thinking (logical)
- Recording Observations
- Reporting Data

Scientific Method

a way to organize your thinking about questions

- Begins with an observation that leads to a question.
- Form a hypothesis – a possible answer that you can test.



Conduct an Experiment

to test the hypothesis

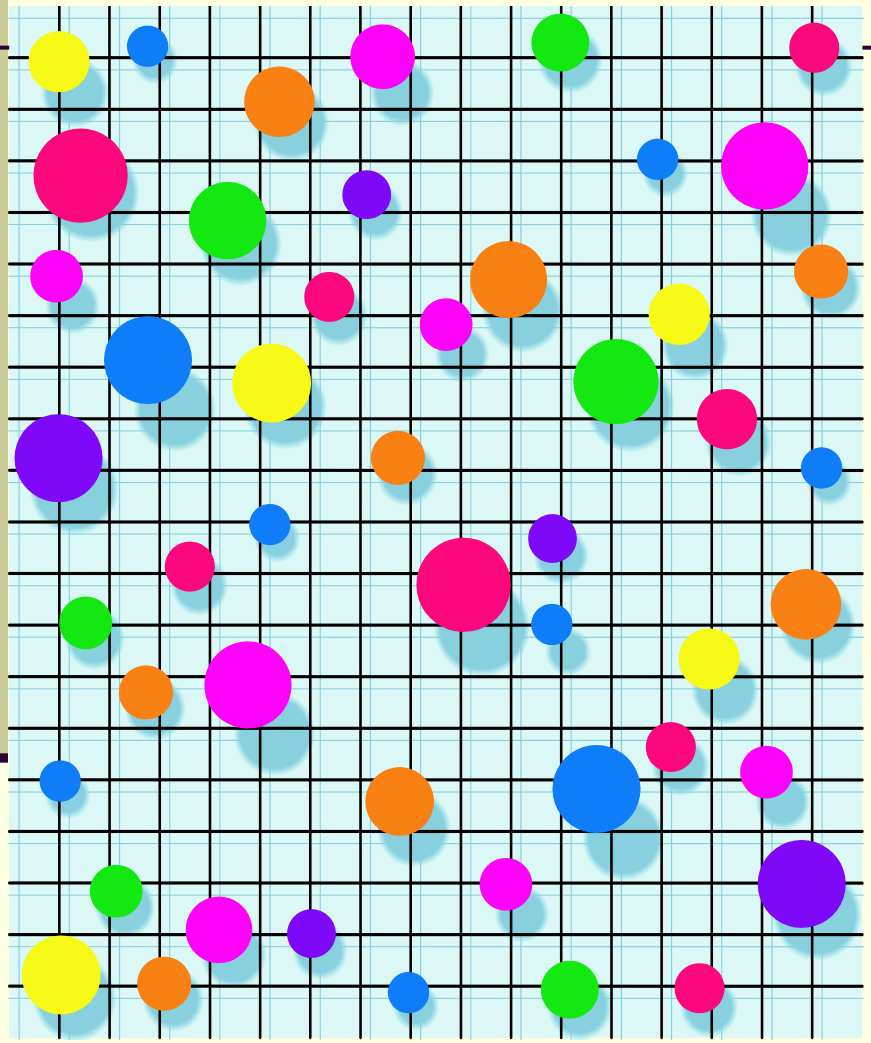
- A good experiment tests only one variable at a time.
- No experiment is a failure.

Variables

Variable – anything that can change in an experiment

- Independent variable – what you change. (manipulated)
- Dependent variable – what changes because of the independent variable. (responding)

Graphs



- A way of organizing and presenting data.
- Makes relationships more evident.

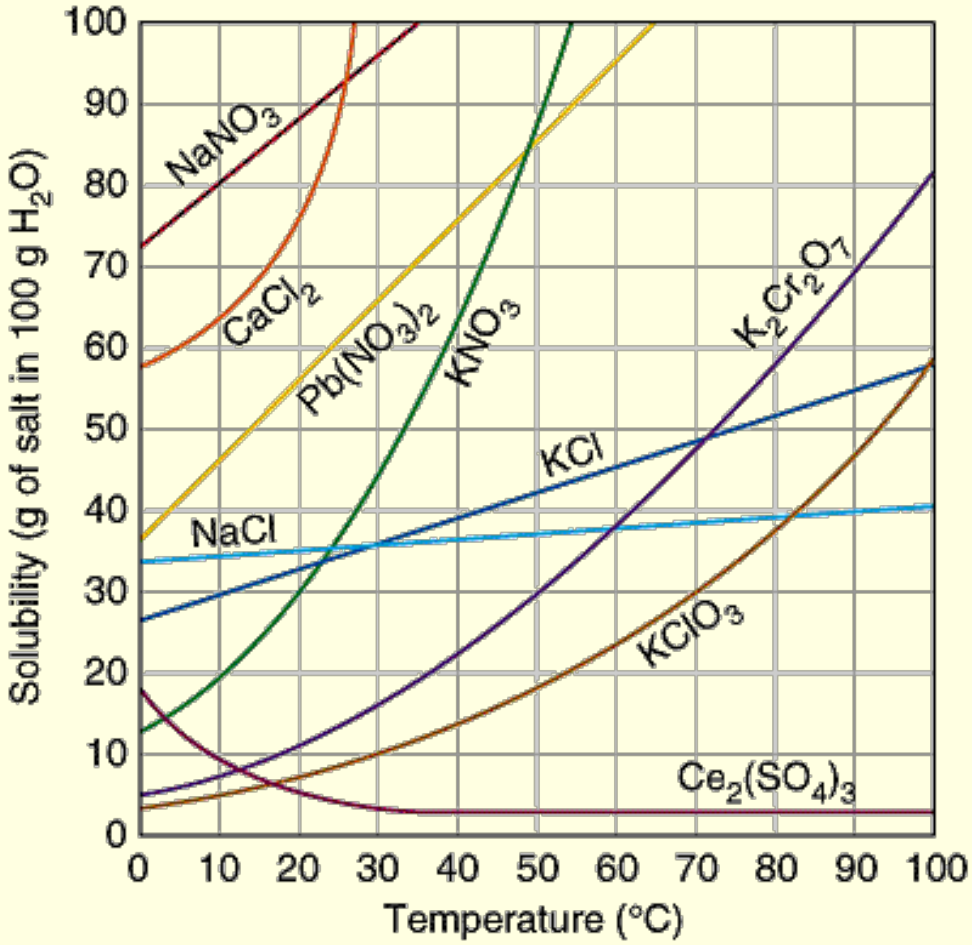
Line graphs

- Best for displaying data that change. (anything over time)
- Numerical vs.

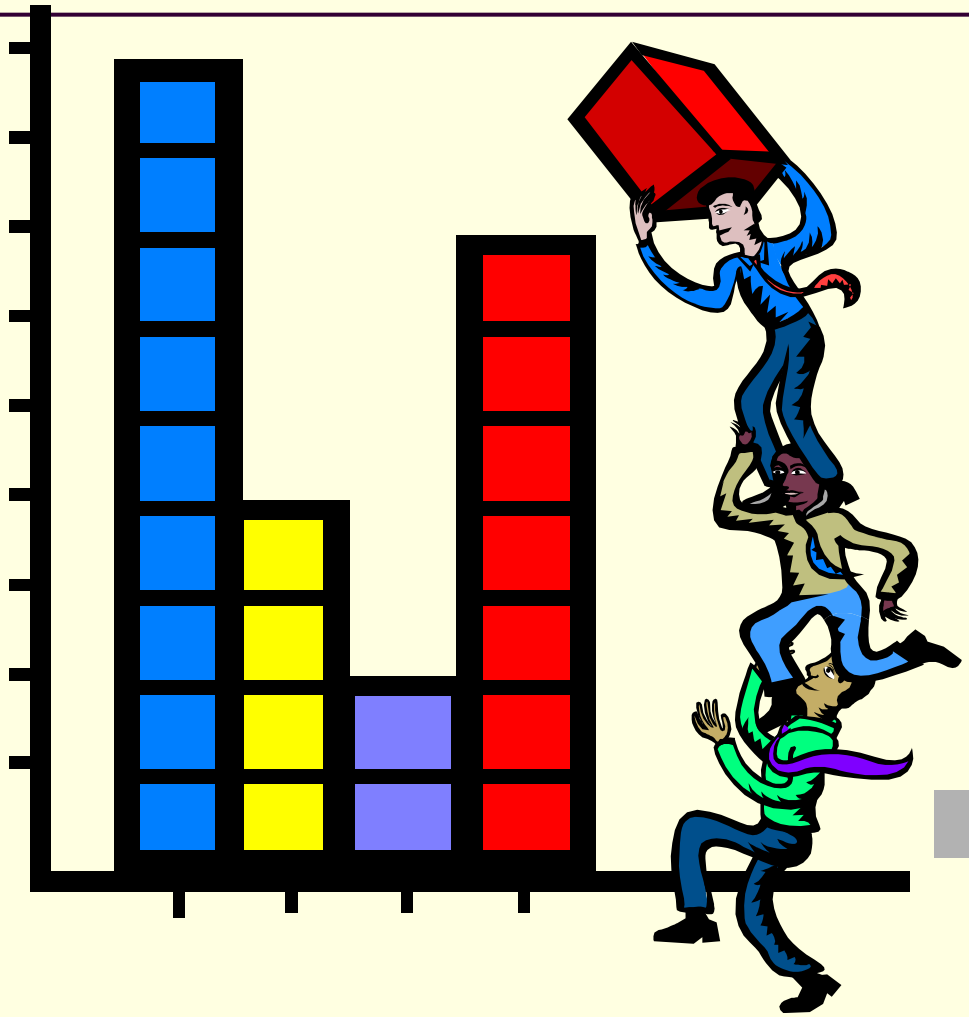
  Numerical.

Multiple Line Graphs

- Best for comparing multiple values and distributions



Bar Graphs

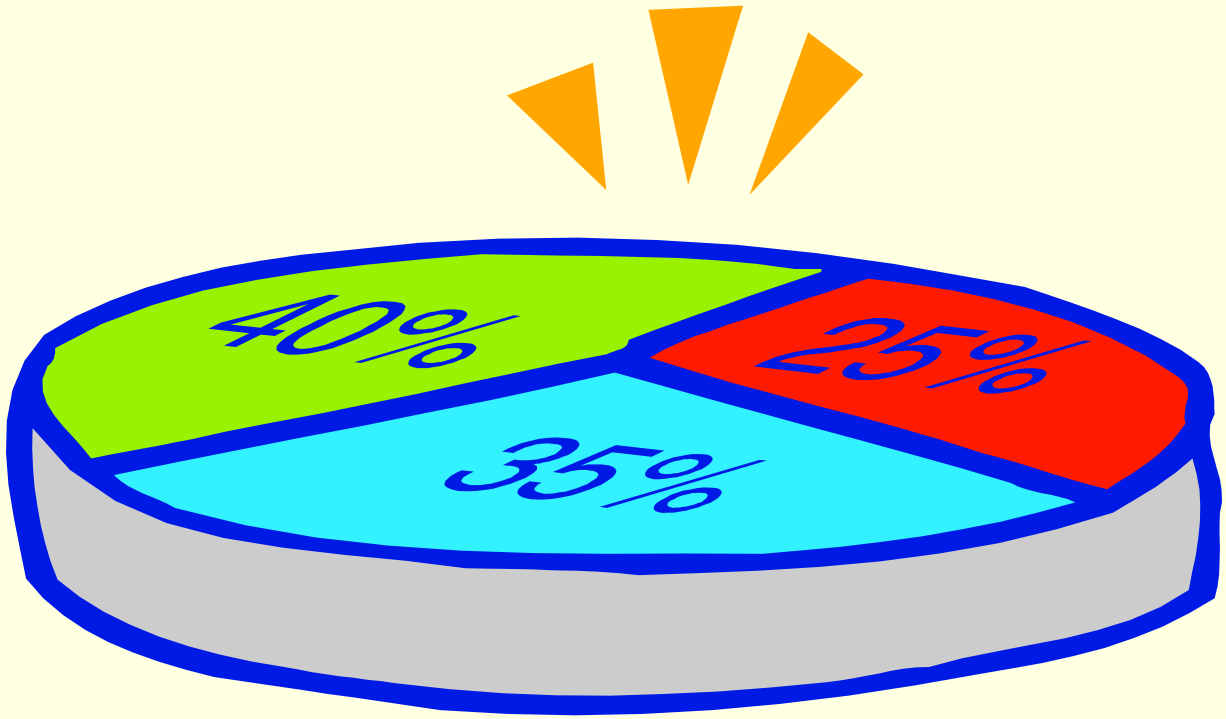


- Best when comparing data for several individual items or events.
- Numerical vs. non-numerical

Circle Graphs

(pie charts)

- Best for displaying data that are parts of a whole.



Units of Measurement

- Scientists use the International System of Units (SI units) for measurements.
- When everyone uses the same units, sharing data and results is easier – less mistakes.

Base Units

- The official SI units to measure:
  - Length = meter
  - Volume = liter
  - Mass = gram
  - Time = seconds
  - Temperature = Kelvin

King Henry - Conversions

- Use the sentence "King Henry Died by Drinking Chocolate Milk." to remember the order of prefixes.

Kilo Hecto Deka base Deci Centi Milli

meter

liter

gram

Scientific Notation

- When writing very large or very small numbers, scientists use a kind of shorthand called scientific notation.
- This is a way of writing a number without so many zeros.

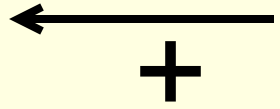
Examples:

- The speed of light is about 300,000,000 m/s
  - Or 3.0×10^{8}
- The mass of a proton is 0.000000000000000000000001673
  - Or 1.673×10^{-24}

All you do is move the decimal

- 850,000,000.0

8 5 0 0 0 0 0 0 0 . 0



$= 8.5 \times 10^{8}$

- 0.000,000,025

0 . 0 0 0 0 0 0 0 2 5

$= 2.5 \times 10^{-8}$

The End