The World Around You

- Objects and Properties
- Measurement Systems
- Metric System
- Understanding from Measurements
Objects and Properties

What does this picture describe?
Activity Session:
Quantifying Properties:

- Why is quantification important?
- Fundamental Quantity
- Process of quantifying with unambiguity
- To avoid vagueness and relative assumptions
- UNIT
- Measurement
Measurement Systems

- Interpretation Problems: Words, Measures, Numbers
- Football:
  - US: Usual football
  - UK: Soccer
- Gallon:
  - US: 3.8 Liters
  - UK: 4.5 Liters
- Billion:
  - US: 1000 M
  - UK: MM

NEED TO HAVE UNIFORMITY
Measurement System

- British System
- Metric System
- System Internationale (SI) UNITS
- Transformation of early Greek and Roman measurements
- Was established by the French Academy of Sciences in 1791
- Modernized Version of Metric System
Standard Units for Metric System

- **Fundamental Units**
- **Derived units**
  - Volume – L³
    - (m)³
  - Velocity – v
    - m/s
  - Force – F
    - Newton = kg.m/s²
  - Current – i
    - Amperes = c/s

- **Length - L**
  - Meters (m)
- **Mass - M**
  - Kilograms (kg)
- **Time - T**
  - Seconds (s)
- **Charge - Q**
  - Coulombs (c)
Metric Prefixes

- **K : Kilo = 1000**
- **M : Mega = 1,000,000 (10^6)**
- **G : Giga = 1,000,000,000 (10^9)**
- **T : Tera = 1,000,000,000,000 (10^{12})**

- **c : Centi = 0.01 (10^{-2})**
- **m : Milli = 0.001 (10^{-3})**
- **μ : Micro = 0.000001 (10^{-6})**
- **n : Nano = 0.000000001 (10^{-9})**
Understanding from Measurements

- Cube: Side 2 inch

- Area of the cube
  - Area = side * side
  - $2 \times 2 = 4 \text{ inch}^2$

- Volume of the cube
  - Volume = side * side * side
  - $2 \times 2 \times 2 = 8 \text{ inch}^3$
Data Interpretation

- Graphing Data
- Statistical Analysis
- Errors in Measurements

Do U Like Science ??
Equation of the Straight Line:

- $y = mx + b$
- $b = y$-intercept
- $m = \text{slope}$
- $m = \frac{\Delta y}{\Delta x}$
Density

- Density = mass/ Volume
- $\rho = \frac{m}{V}$
- Units = kg/ m$^3$
- Alternate unit: grams/cubic centimeter (g/cc)
- Specific Gravity: Density of Liquid/Density of water
- $\rho_{\text{water}} = 1000 \text{ g/cc or } 1 \text{ kg/m}^3$
Physics, Physics : Everywhere

- Ultimate Half and Half
- Harp Lager:
  - 1.011-1.012
- Guinness Extra Stout:
  - 1.009-1.010
- Guinness Pub Draft:
  - 1.008-1.009
Conversion of Units

- 1 inch = 2.54 cm
- 1 lb = 453.6 g
- 1 minute = 60 seconds

Activity Session:
- Convert 10 inches to millimeters
- Convert 10 inches to meters
- Convert 15 lbs to kg
- Convert 2 hours to sec
- Your height in meters