Unit I NOTES. INTRODUCTION to Physical Science

What is physical science?

- Study of energy + MATTER
  - PHYSICS - AND CHEMISTRY - LIGHT

SCIENTIFIC METHOD

① Make an observation → state the problem!
- WHY? HOW? WHAAA?

② GATHER INFORMATION
- WHY? BACKground information to solve problem!
- WHO? DEPENDS!

③ FORM A HYPOTHESIS
- POSSIBLE EXPLAINATION FOR PROBLEM
- "EDUCATED guess"
- MUST BE TESTABLE!
- DOESN'T HAVE TO BE Right

④ TESTING A HYPOTHESIS
- EXPERIMENT SETUP (MUST BE REPEATABLE!)
- VARIABLES (VARY = CHANGE)
  - Independent Variable: "I change"
    - Time, temp, pH
  - Dependent variable: changes in Response to other variables
- CONSTANTS - STAY THE SAME!
  - WHY? ONLY WANT TO TEST ONE Thing.

→

- EXPERIMENTAL group - Recieves treatment
- Control group - NO TREATMENT "Baseline"

(5) ANALYZING DATA
- BASED ON OBSERVATIONS.

(6) DRAW CONCLUSIONS
- IS HYPOTHESIS SUPPORTED?
→ YES - REPEAT EXPERIMENT
→ NO - MODIFY HYPOTHESIS + NEW EXPERIMENT

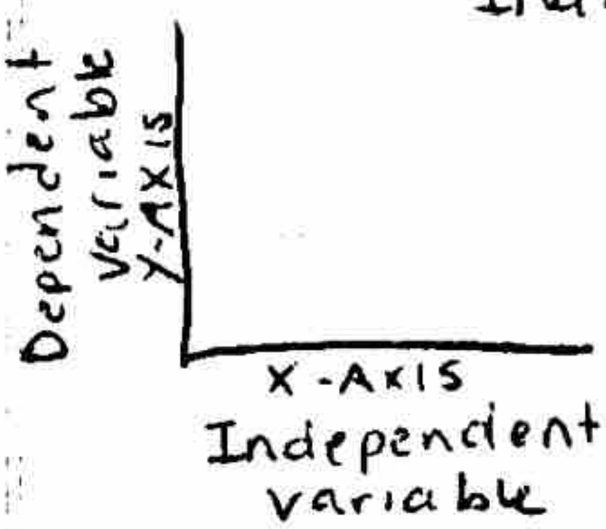
PRESENTING SCIENTIFIC DATA

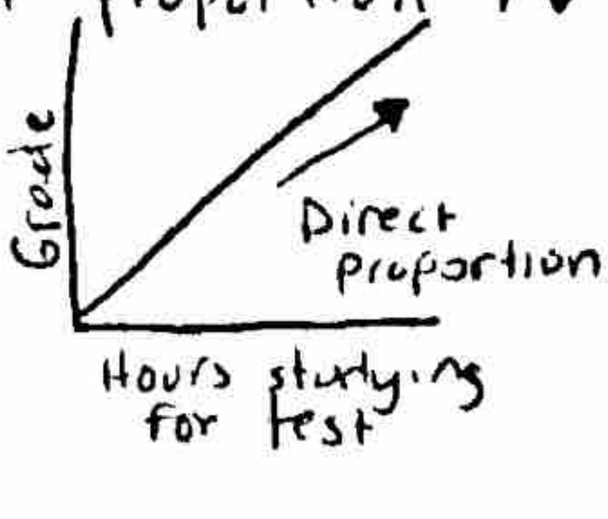
GRAPHS!

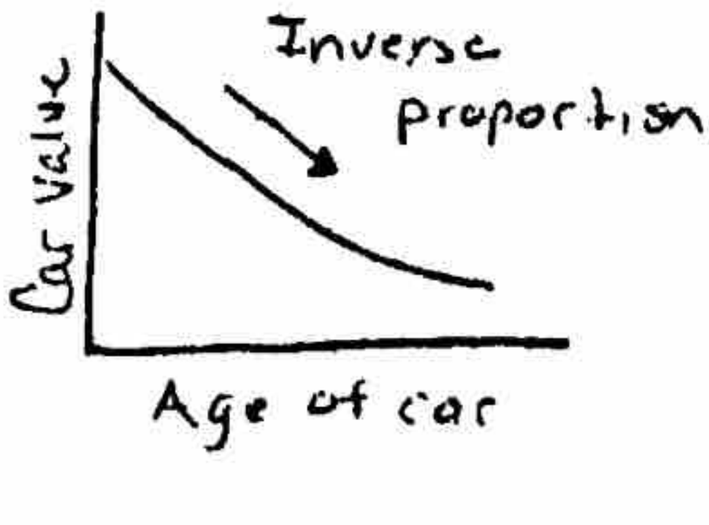
-NEED A TITLE

① Line graph → changes that occur in TWO RELATED VARIABLES!

- Direct proportion: ↑↑
- Inverse or Indirect proportion ↑↓







* SLOPE: the rate the independent + dependent variable are changing

Slope (m) $m = \Delta y/\Delta x$ = rise/run

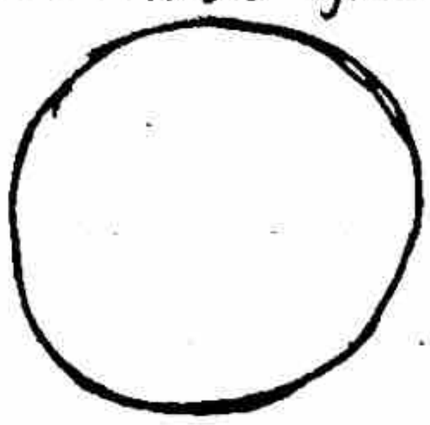
*** Δ = "change"

② PAR graph · used to compare sets of measurements

③ CIRCLE graph · shows how parts Relate to the whole (100%)

- uses percentages
- MUST = 100%

TITLE : VIDEO game preferences AMONG students



X-BOX :

PLAYSTATION :

WII :

PC :

NONE :

TOTAL :

UNIT 1 NOTES · MEASUREMENT

* ALL MEASUREMENTS NEED A QUANTITY + UNIT!

* THE SI SYSTEM FOR UNITS *

7 MEASURED QUANTITIES! (WE USE 5)

① Length: longest dimension of object

- unit: meter (m)

- Tools: Ruler, meterstick

② Mass: the amount of matter in an object

- Unit: Kilogram (kg) (1000 grams)

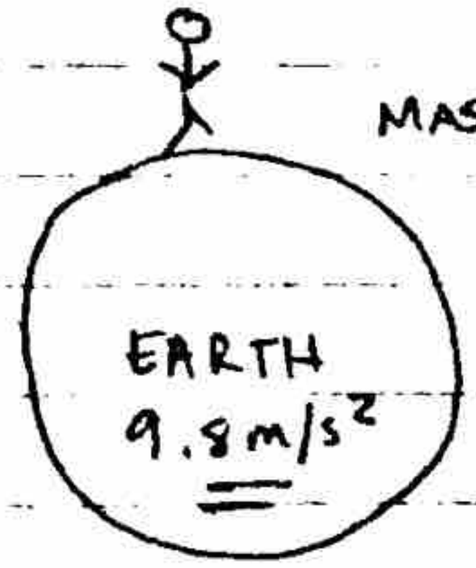
- Tools: Balance, scale

HEY! I KNOW POUNDS - CONVERT!

2.2 lbs = 1kg so,

$$150 \text{ lbs} \cdot \frac{1 \text{kg}}{2.2 \text{lbs}} = 68.18 \text{ kg}$$

* MASS VERSUS WEIGHT *



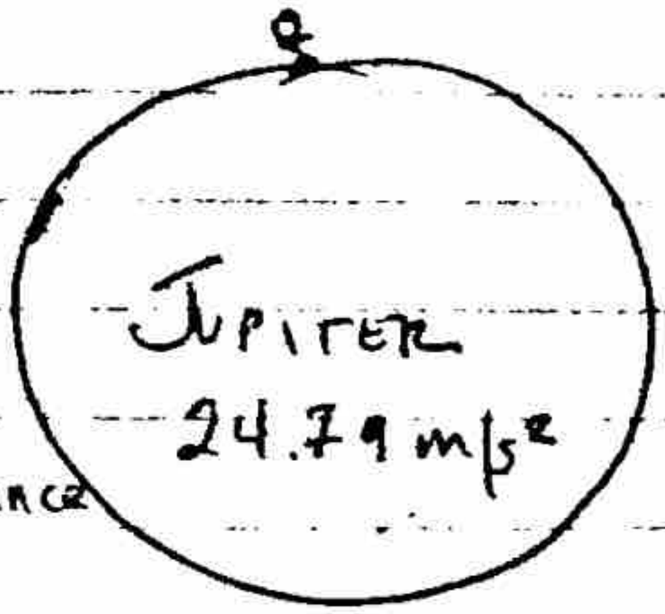
MASS = 68.18kg x 24.79 m/s²

N

MASS = 68.18kg x 1.62 m/s²

N

MASS = 68.18kg x 24.79 m/s²



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* WEIGHT IS BASED ON GRAVITY!

* Gravity is based on size + distance

- WEIGHT VARIES
- MASS STAYS THE SAME

③ TEMPERATURE

- Quantitative expression of hot / cold
- ~~UNIT~~ UNIT · Kelvin (K), what?

°F° → °C° → K

① °F → °C

$°C = \frac{5}{9}(°F - 32)$ or $°F = \frac{9}{5}(°C) + 32$

[°C · 0°C · freezing
100° · Boiling
°F · 32°F, 212°F]

② °C → K

$K = 273.15 + °C$

- TOOL : thermometer

④ Time (Time travel joke?)

- Interval between two events
- Unit : seconds (s)
- Tools : Clock, stopwatch

⑤ Electric current

- Flow of electric charge − → +
- Unit : ampere (A)
- Tool : ammeter

TWO OTHER IMPORTANT MEASUREMENTS!

① Volume

- Amount of space an object takes up
- Units : cubic meters m^3

Often seen as cm^3 or mL

→

Finding volume

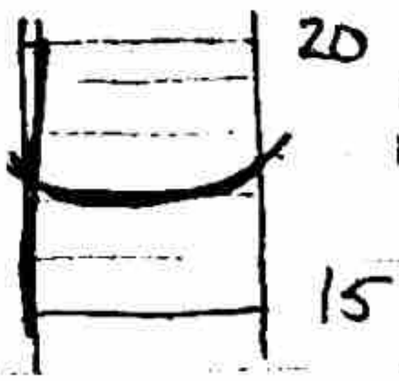
(A) Regular shaped objects

$V = l \times w \times h \rightarrow m^3$ or cm^3

(B) Liquids →

pour in graduated cylinder

→ mL



Read meniscus

17 mL !

(C) Displacement method

Step 1 : Find original volume (V_i)

Step 2 : Add object to cylinder

Find final volume (V_f)

Step 3 : Calculate volume

$V_{object} = V_f - V_i$

(2) DENSITY : mass per unit volume

unit: kg/m^3

g/mL + g/cm^3

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

Water = 1.0 g/cm^3

Higher density → sinks !

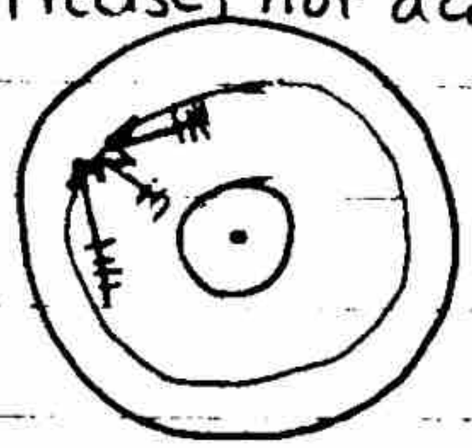
Lower density → floats !

Units of measurement

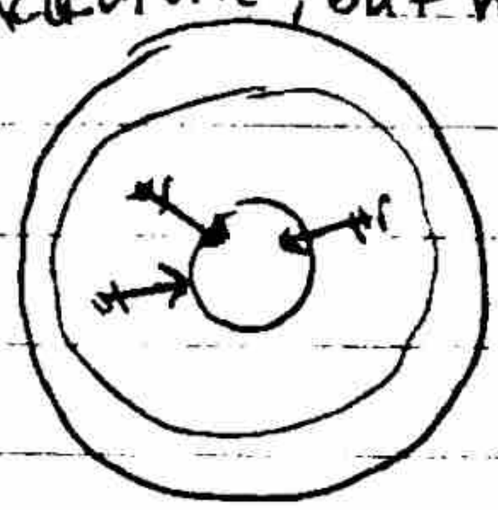
Precision: How exact a measurement is

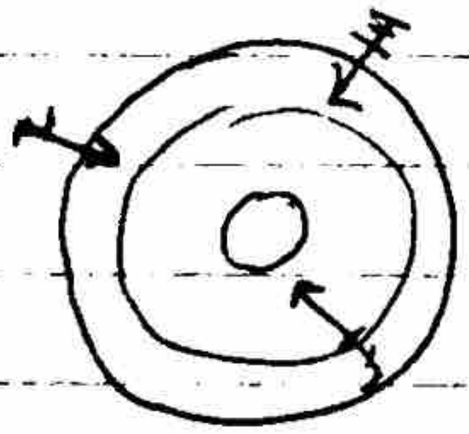
Accuracy: Closeness of a measurement to the actual value

Precise, not accurate!



Accurate, but not precise!





ARE YOU EVEN PLAYING?
NOT PRECISE,
NOT ACCURATE

Precise + Accurate!