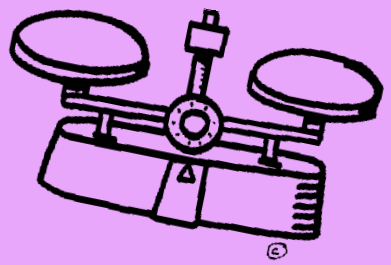
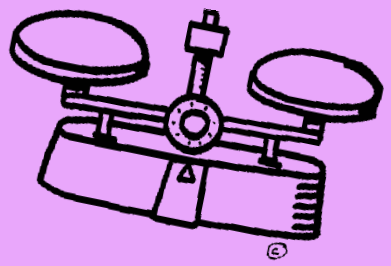
Mass vs. Weight

Short course on mass, weight, density, and volume.



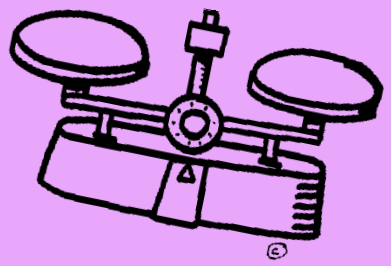
What is mass?

- The amount of matter an object contains.
  - (Matter = something that has mass and takes up space.)
- Constant
  - Doesn't change no matter where it is.
- Not dependent on gravity.
- Always remains constant
- Measured by using a balance comparing a known amount of matter to an unknown amount of matter.



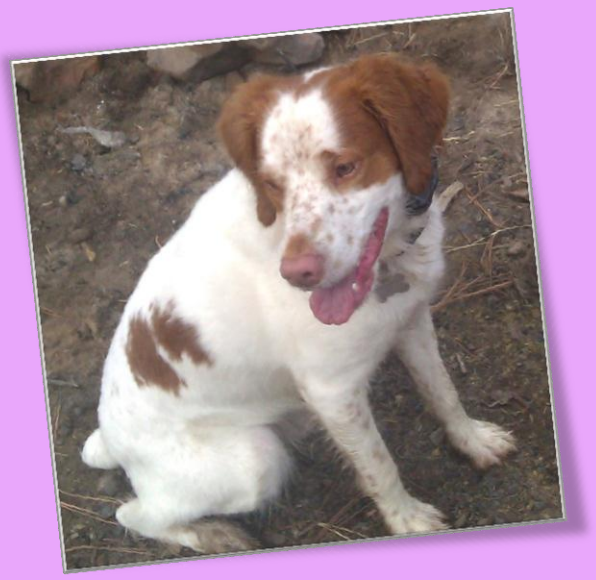
What is weight?

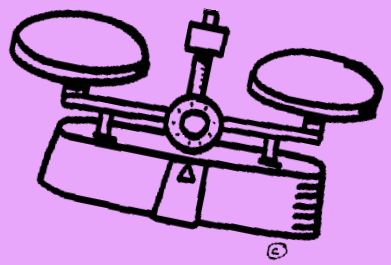
- A measure of the force of gravity on an object.



What is weight?

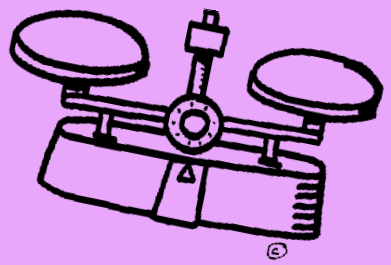
- Changes with location
  - For example, Duke, my dog, weighs 45lbs (21kg) on Earth. If my dog became an astromutt, he would weigh nothing in space!
    - His weight on the planets would be
      - Moon : 7lbs
      - Mars: 17lbs
      - Jupiter: 105lbs
  - The reason for the different weights is….
      - Different gravity fields!





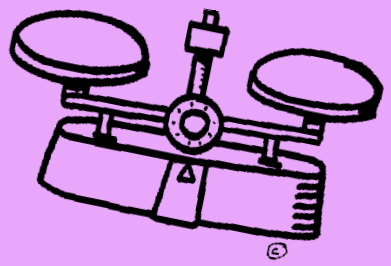
What is weight?

- A measure of the force of gravity on an object.
- Changes with location.
  - weight of an object changes if the gravity changes
- Weight=mass x gravity
- Measured with a scale
  - (measuring the pull of gravity!)



What is Volume?

- a measure of the amount of space that is occupied by a solid, liquid, or gas.
- Common volume units are
  - mL (liquids) cm^3 (solids)

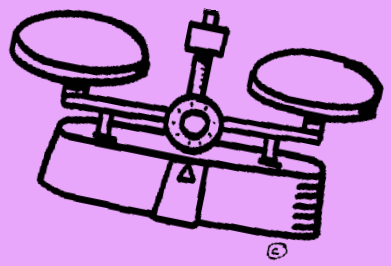


How is Volume Measured?

1. direct measurement of liquid (units = mL)

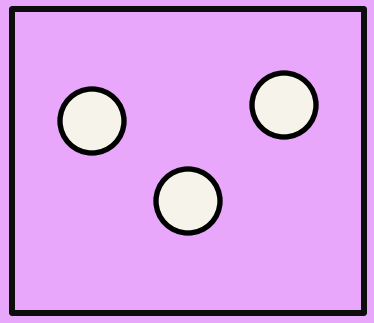
2. displacement of a liquid by a solid (units = mL changed to cm^3)

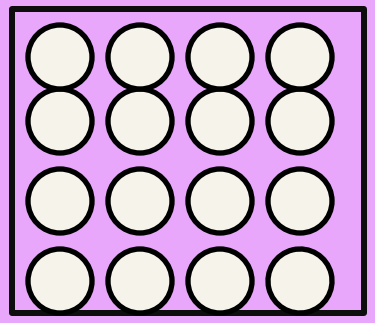
3. LxWxH of a cube or rectangular solid (units = cm^3)

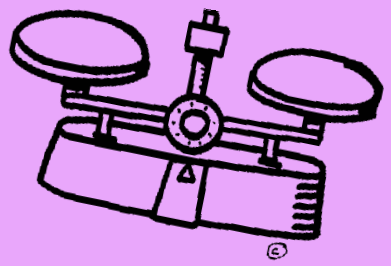


What is Density?

- the amount of something in a particular space or area
  - the amount of "stuff" in a space







How to calculate density…

- Use the magical formula
  - Density = mass/volume
  - D = m/v