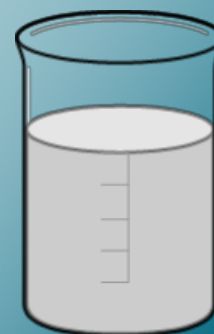




Measuring Matter

Lesson 1-3



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What are the units used to express mass and volume?



How is density determined?

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What units are used to express mass and volume?

Weight

Your weight is a measure of the force of gravity on you

On another planet, the force will be more or less depending if the planet is bigger or smaller than Earth

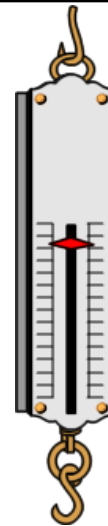
Bigger= more (Jupiter = 2x)

smaller= less (moon = 1/6 of Earth)

100 lbs. on Earth = 16.7 lbs on moon

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To find weight- use a spring scale
object's weight pulls down
units= Newtons



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Mass

The amount of matter is in an object

Does not change if the location changes

Not affected by gravity

physical property

scientists use mass instead of weight

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To measure the property of matter, scientists use the International System of Units (SI Units)

French name for *System International d'Units*

SI Unit for mass = kilogram

1kg= 22 lbs

Smaller is grams

1000g= 1 kg

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Practice: Convert grams to kilograms

150g baseball

390 soda can

1600 pineapple

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Volume

All matter takes up space

Amount of space that matter occupies is called volume

Solids, liquids and gases all have volume.

SI Unit for volume = m^3

other units = cm^3 , L, mL

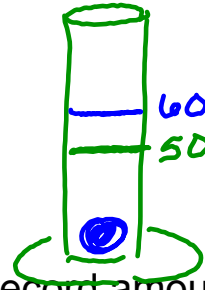
**** 1mL is the same volume as 1 cm^3 ****

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Calculating volume

Regular solid = $l \times w \times h$

Irregular solids = displacement



1. fill graduated cylinder with water and record amount
2. carefully add object
3. measure and record the new water level
4. subtract (final amount - starting amount)
5. in your answer change mL to cm^3

$$1 \text{ mL} = 1 \text{ cm}^3$$

liquid solid

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How is density determined

Density is a measure of the mass of a material in a given volume

expressed in grams/centimeters³ (g/cm^3) $\frac{\text{g}}{\text{cm}^3}$
 water's density = $1 \text{ g}/\text{cm}^3$ or $1 \text{ g}/\text{mL}$

You can determine the density by dividing mass/volume

$$D = \frac{m}{V}$$

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Sinking and floating

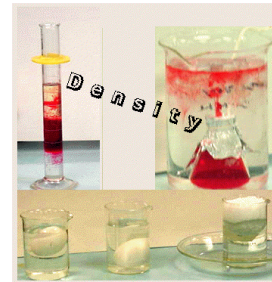
You know water's density is 1g/cm^3

Objects with a density greater than 1g/cm^3 will sink

Objects with a density less than 1g/cm^3 will float

ex. Italian dressing

ketchup



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| SUBSTANCE | DENSITY (G/CM^3) |
|------------|-----------------------------|
| AIR | 0.0013 |
| WOOD (OAK) | 0.85 |
| WATER | 1.00 |
| ICE | 0.93 |
| ALUMINUM | 2.7 |
| LEAD | 11.3 |
| GOLD | 19.3 |
| ETHANOL | 0.94 |
| METHANOL | 0.79 |

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Using density

Density is a physical property of a substance

Unique to each substance

Used to identify substances

ex. Gold's density = 19.3 g/cm^3



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Measuring Matter

The SI unit of mass is

The SI unit of volume is

You can determine the density of a sample of matter by dividing its by

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