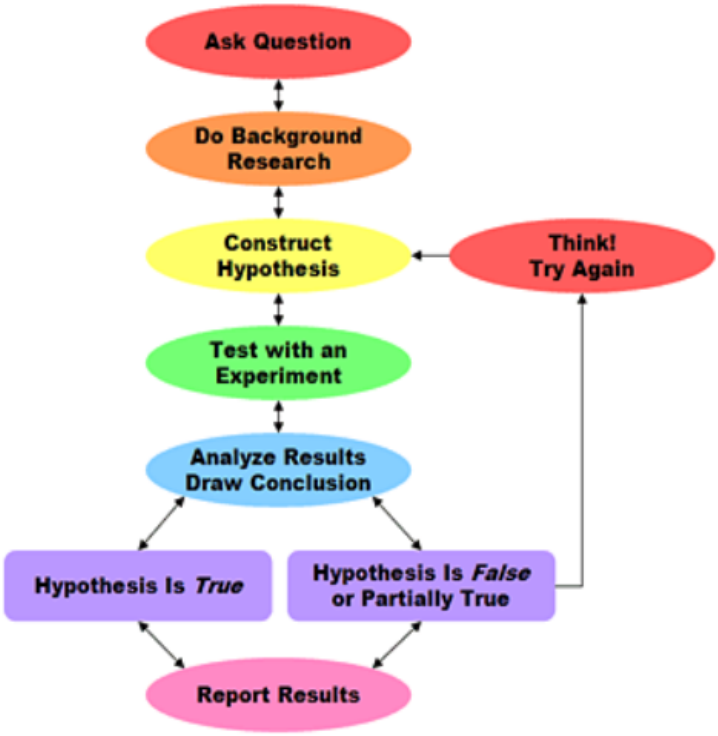
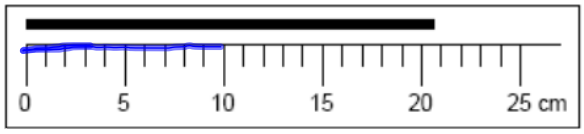
Scientific Method

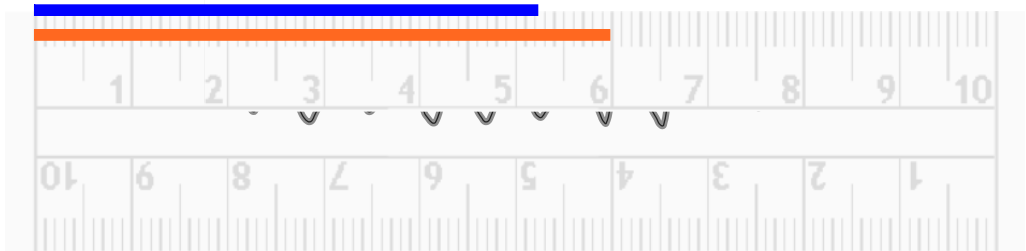


Sep 13-7:37 AM

Uncertainty in Measurement

- When taking measurements, the accuracy of your measurement is limited to the precision of the instrument.





■ = 5.24
■ = 6.00

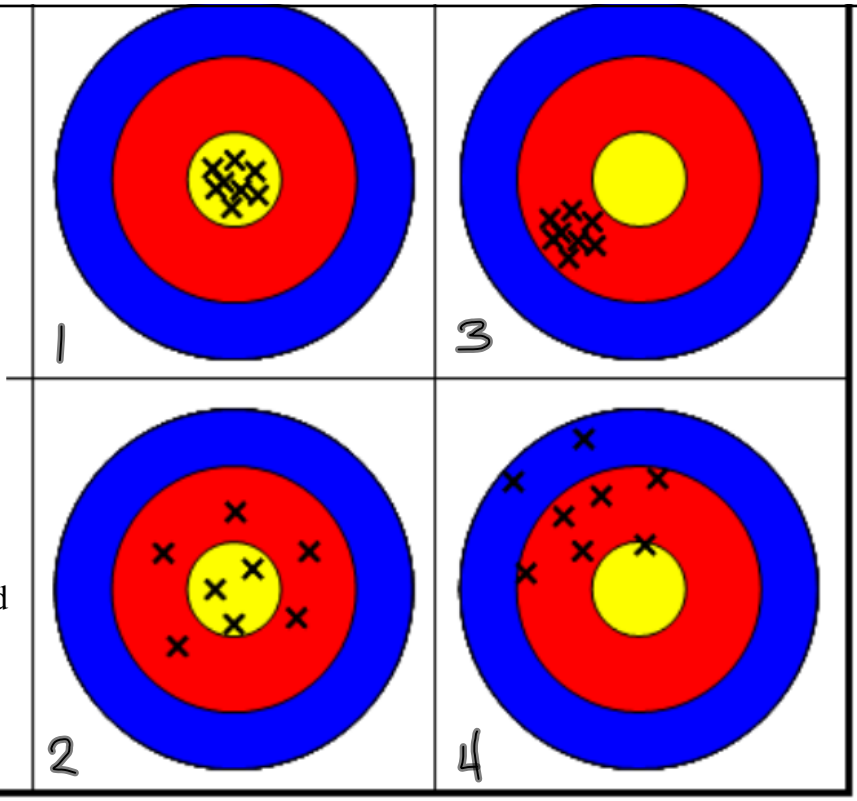
Nov 14-9:08 AM

Accuracy

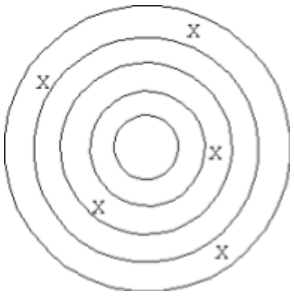
the closeness of a measured value to a target value

Precision

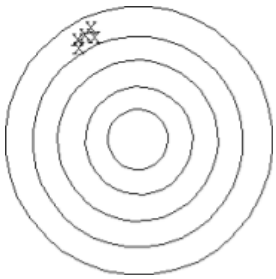
The ability to reproduce a close range of measured values



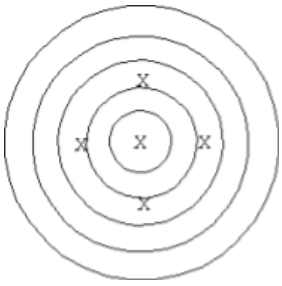
Nov 10-1:58 PM



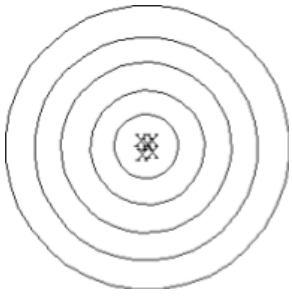
NOT accurate, NOT precise



precise NOT accurate



Accurate NOT precise



accurate AND precise

Apr 26 - 10:58 AM

2 Types of Data

Quantitative	Qualitative
a number with a unit	a physical description (uses senses)
Example: There are TWO staplers	Example: The staplers are red

Sep 14-8:55 AM

Standard Scientific Notation

has the format:

$$M \times 10^{n}$$

incorrect

45.9×10^{4}

correct

4.59×10^{4}

M = nonzero whole # (1-9)

n=any whole #

$$10^{0} = 1$$

Apr 21-9:31 AM

L I P Rule

L e f t

I s

P o s i t i v e

Nov 10-2:14 PM

Put into scientific notation

2030. mi.

0.00020 in.

250,$\bar{0}$00 ft.

Take out of scientific notation

58×10^{2} mi.

2.0×10^{-3} cm.

1×10^{0} L

Sep 12-4:41 PM

1) 3,400 _____

2) 0.000023 _____

3) 101,000 _____

9) 2.30×10^{4} _____

10) 1.76×10^{-3} _____

11) 1.901×10^{-7} _____

Nov 10-2:21 PM

Scientific Notation Practice Worksheet Name: _____

Convert the following numbers into proper scientific notation:

1) 3,400 _____

2) 0.000023 _____

3) 101,000 _____

4) 0.010 _____

5) 45.01 _____

6) 1,020,000 _____

7) 0.0671×10^{4} _____

8) 450×10^{-3} _____

Convert the following numbers into standard notation:

9) 2.30×10^{4} _____

10) 1.76×10^{-3} _____

11) 1.901×10^{-7} _____

12) 8.65×10^{-1} _____

13) 9.11×10^{3} _____

14) 5.40×10^{1} _____

15) 1.76×10^{0} _____

16) 7.4×10^{-5} _____

Multiplication	***Scientific Notation***	***Decimal Notation***
17) $(1 \times 10^{3}) \times (35 \times 10^{1}) =$	_____	_____
18) $(3.0 \times 10^{4}) \times (2.0 \times 10^{3}) =$	_____	_____
19) $(5 \times 10^{-6}) \times (11 \times 10^{6}) =$	_____	_____
20) $(2 \times 10^{-4}) \times (40. \times 10^{3}) =$	_____	_____

Division	***Scientific Notation***	***Decimal Notation***
21) $(8 \times 10^{6}) / (4 \times 10^{3}) =$	_____	_____
22) $(3 \times 10^{8}) / (1 \times 10^{4}) =$	_____	_____
23) $(50 \times 10^{3}) / (2 \times 10^{5}) =$	_____	_____
24) $(9 \times 10^{21}) / (3 \times 10^{19}) =$	_____	_____

Apr 22-8:29 AM

Multiplication i in Scientific Notation

1) Multiply all numbers

2) Add the exponents.

$(1 \times 10^{3}) \times (35 \times 10^{1}) =$ _____

Apr 21-8:51 AM

Division in Scientific Notation

1) Divide the numbers

2) Subtract the exponents.

$(8 \times 10^{6}) / (4 \times 10^{3}) =$ _____ _____

Apr 21-8:54 AM

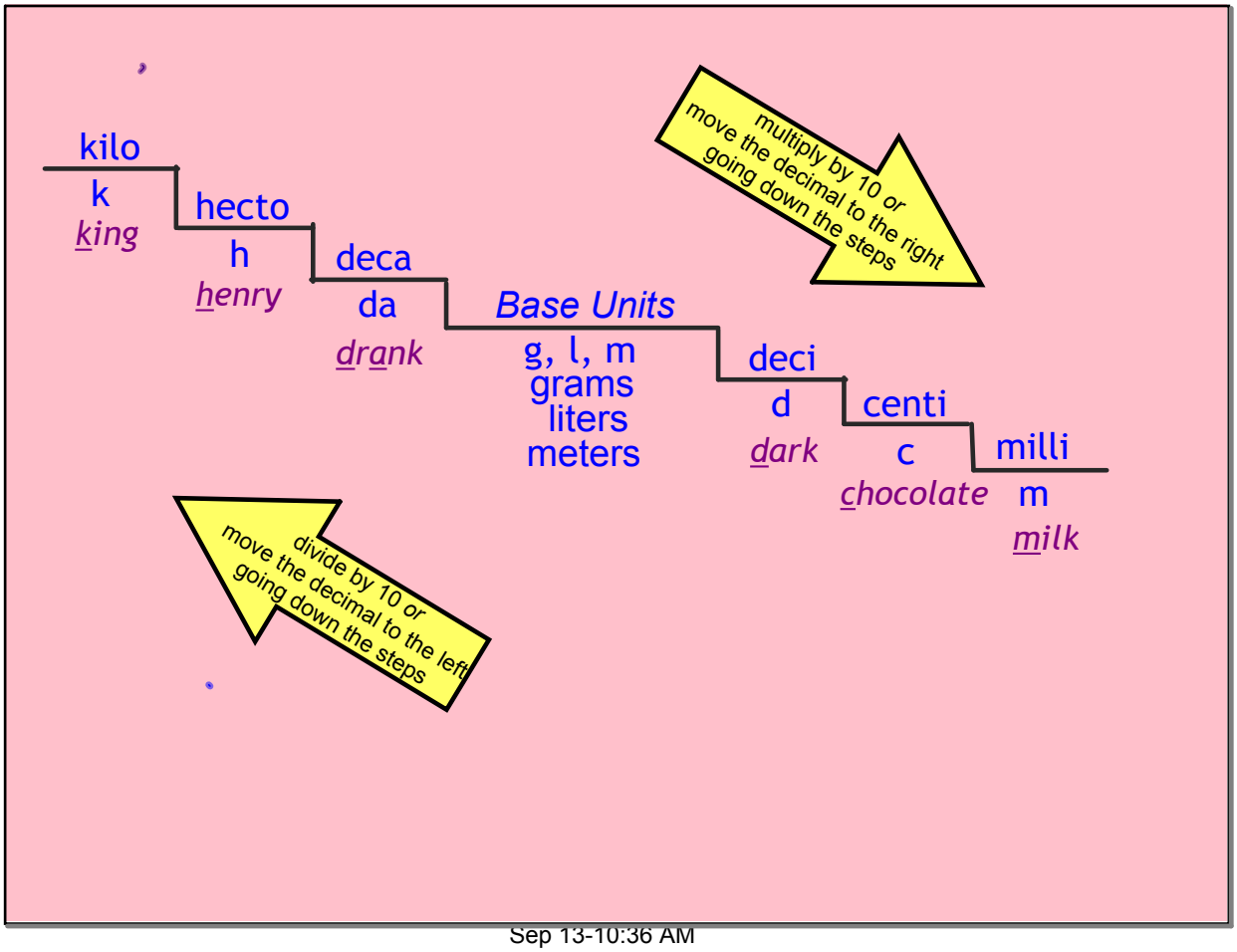
Additon and Subtraction in Scientific Notation

- When adding or subtracting any numbers you must have the decimals lined up.
- Only numbers that that have matching exponents or NO exponents will have their decimals lined up.
- If the exponents are different, you MUST change them to match.

Sep 12-4:34 PM

Unit 1 -Math and Measurement
Metric System Notes

Sep 12-5:07 PM



Sep 13-10:36 AM

The International (SI) System of Units

base units of measure

all other SI units are derived from these

These SI base units and their physical quantities are:

Physical Quantity	What it measures	Base unit	Symbol
Length	distance b/w 2 pts	meter	m
Mass	amount of matter something contains	kilogram	kg
Time	time	second	sec, s
Temperature	energy from particle motion	Kelvin	K
Amt of substance	# of particles	mole	mol
Volume	how much space something takes up	liter	L, l

Sep 12-5:01 PM

Derived Units-

Units that are a result of mixing several other units as a result of a formula.

Examples:

Density= $\frac{\mathbf{g}}{\mathbf{ml}}$

Volume = $\mathbf{cm^3}$ l x w x h

Area = $\mathbf{m^2}$

Sep 17-8:13 AM

Temperature

°F - fahrenheit
°C - celsius
K - Kelvin

☆ **Celsius** is based on the freezing & boiling pts. of water
0°C, 100°C

Kelvin is based on the Absolute Zero theory.
no negative temps & no ceiling (high pt)

Absolute Zero

Where all atomic motion theoretically stops

this point would be @ 0 K

Sep 12-4:50 PM

Temperature Conversions

- 0°C = 273K
- K = °C + 273
- °C = K - 273

1° of change is equivalent in both °C & K

$$\frac{9}{5}\,°C + 32 = °F$$

$$(°F - 32)\,\frac{5}{9} = °C$$

Sep 13-11:40 AM

Weight vs. Mass

Mass: is the amt. of matter that something contains

- stays the same anywhere!

Weight = is directly affected by the force of gravity

- = mass x gravity

Sep 12-4:38 PM

volume

- A Liter is equivalent to the volume occupied by a cube of exactly 10 cm per side.
- how much space that something occupies.

1 ml-1cm^3

UNITS OF VOLUME-

ml, L, cm^3

Sep 12-4:46 PM

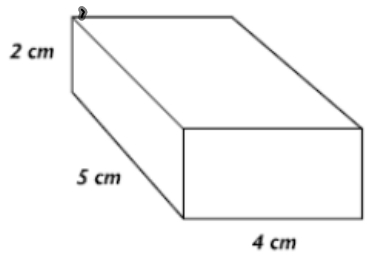
Finding Volume

for regular shape solids:
- sphere
- cylinder
- rectangle
- square

use volume formulas / rulers

rectangular solids:

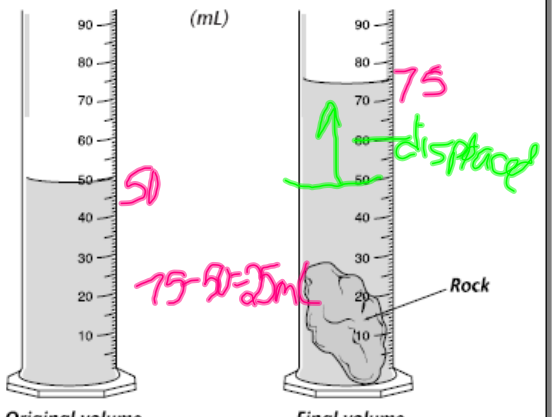
volume = l x w x h



for irregular shape solids:
- rocks
- plastic
- jewelry

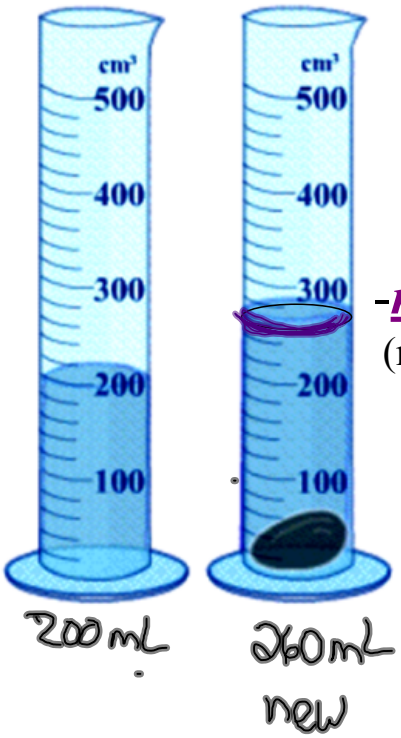
use graduated cylinder

displacement method



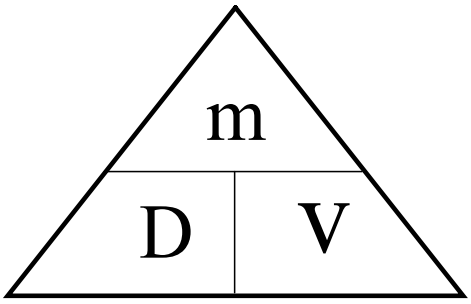
Feb 15-4:36 PM

Displacement method $1\ mL = 1cm^3$



If the rock has a mass of 90 grams;
what is it's volume?
what is it's density?

-***meniscus***
(read from the bottom of the bubble)



Feb 15-4:37 PM

Density

☺-a ratio of the amount of mass that an object contains per volume of space that it occupies. Density = $\frac{\text{mass}}{\text{volume}}$

*intrinsic property =
it doesn't matter if you have a little, density stays the same

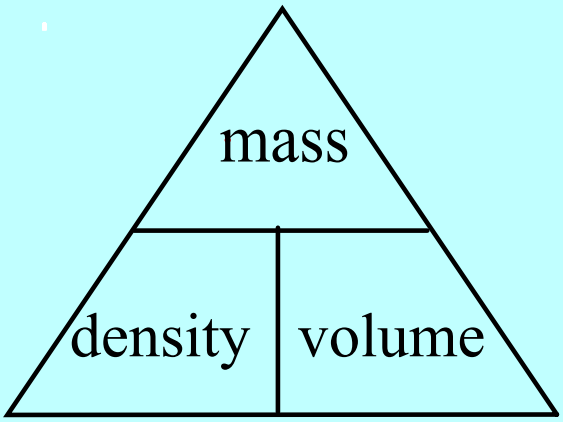
☺-It can be used to identify a substance

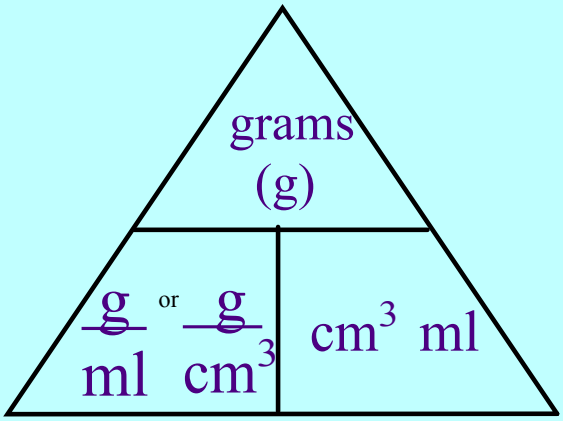
ex: *PURE* Gold =19.3 $\frac{g}{ml}$

The less pure it is, the less dense it will likely be.

Feb 15-4:34 PM

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



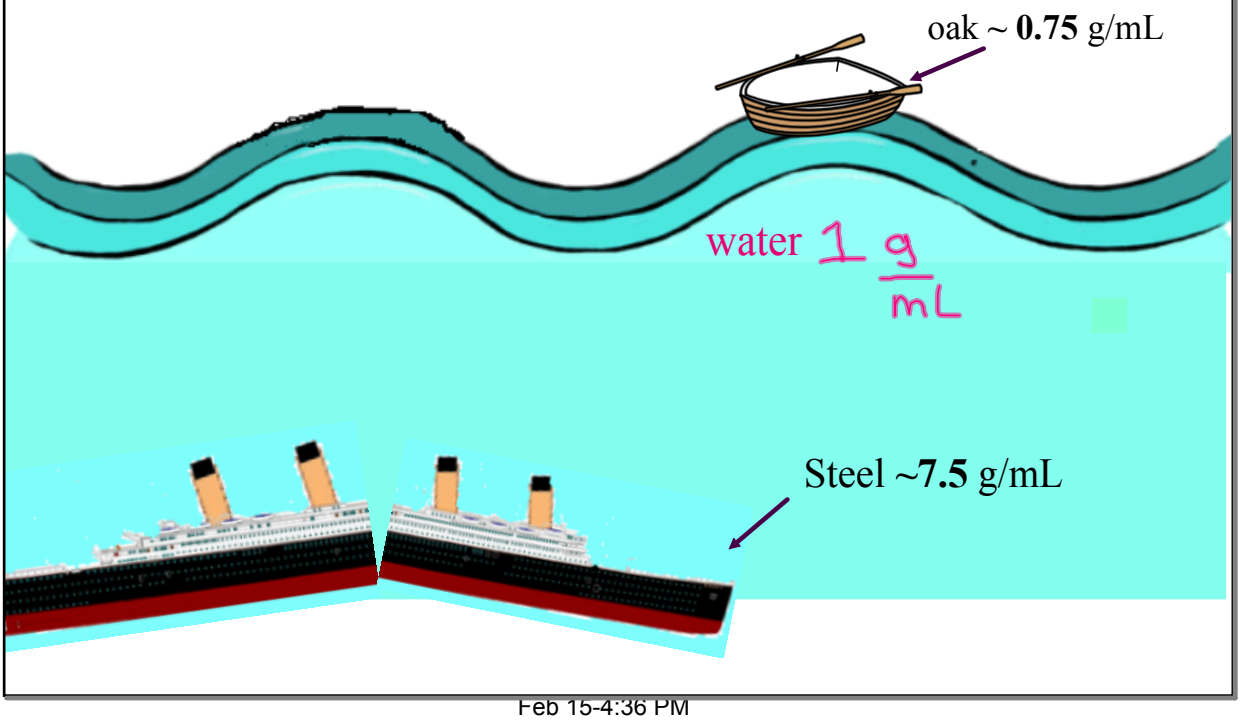


cover the one you're looking for

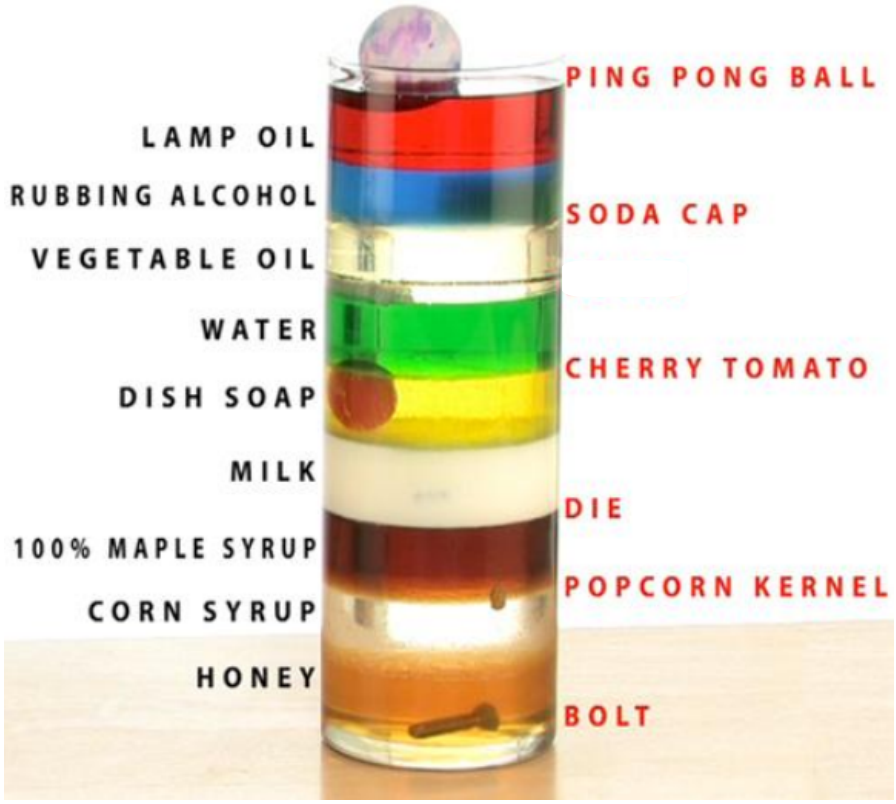
Feb 15-4:35 PM

Density and how things "stack up"

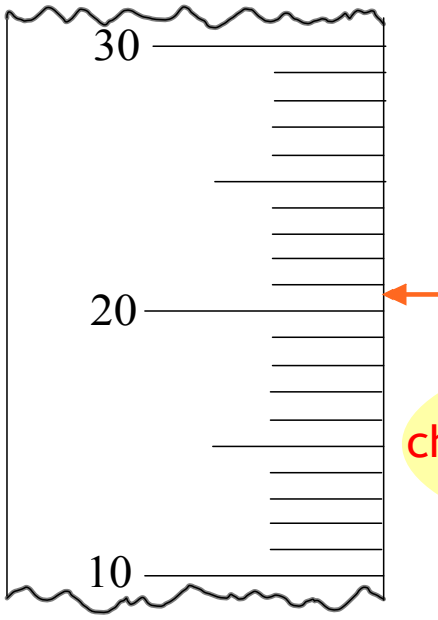
- < 1g/mL will float on water
- > 1g/mL will sink in water



Feb 15-4:36 PM



Feb 16-8:15 AM



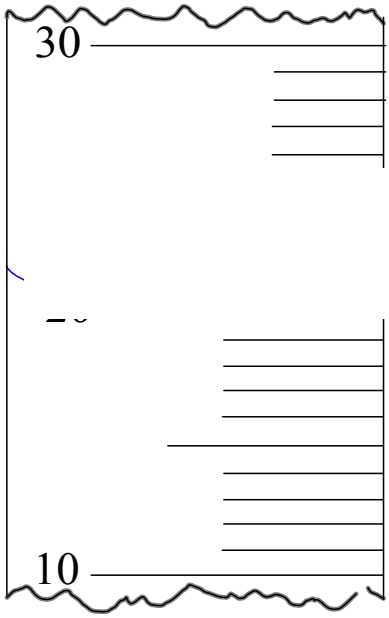
Graduated Cylinder (mL)

Since this graduated cylinder is marked to the ones place, your answer will include the tenths place.
This means that your answer could end in:
.1, .2, .3, .4, .5, .6, .7, .8, .9, .0

So you have a 1 in 10 chance that your answer will end in .0 or a 10% chance!

So why will I see this on 95% of your labs?

Feb 15-4:39 PM

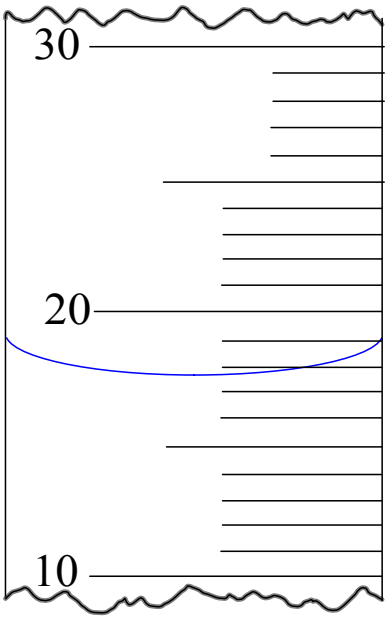


What is this measurement?

WHY is there ONE decimal place?

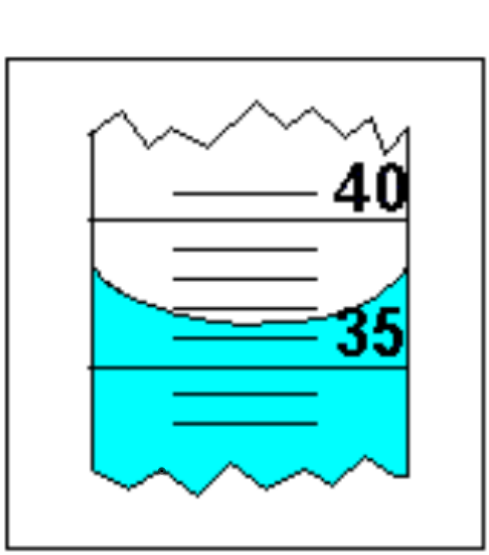
It is NOT 20.0 or 21.0, it lands in between.
There are markings to indicate the ones place (20, 21, 22)
so your measurement MUST be taken one place further.

Feb 15-4:39 PM



What is this measurement?

Apr 23-11:13 AM



_____ mL

_____ mL

Feb 15-4:38 PM

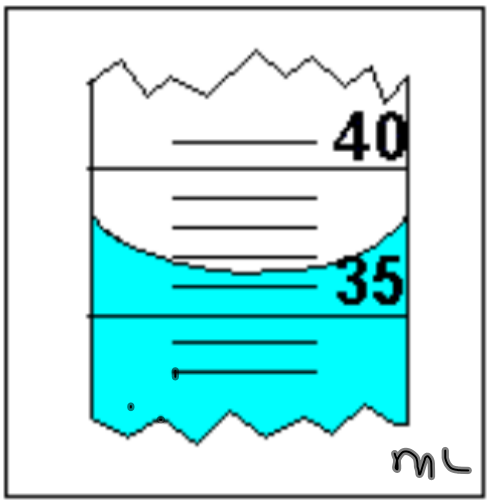
Perc%nt Error Calculation

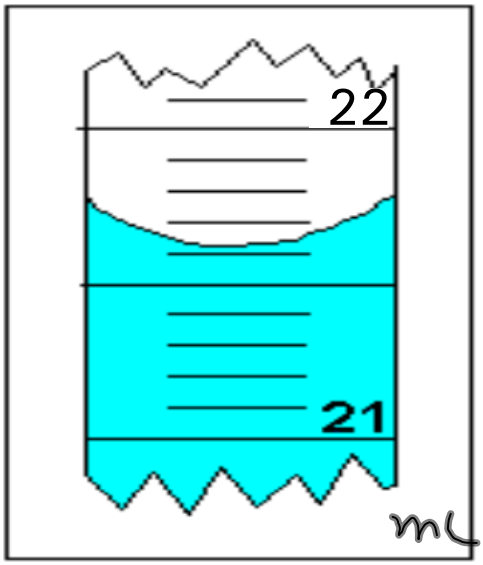
- this equation is used to calculate how much error occurred during a laboratory or measurement

$$\left| \frac{\text{accepted value} - \text{experimental value}}{\text{accepted value}} \times 100 \right|$$

These are absolute value brackets, so ignore any negative values

Feb 17-3:26 PM





_____ mL _____ mL

Apr 23-10:56 AM

Foster's 5-Step problem solving

Step 1 - Determine what is unknown
(what are the units for your answer?)

Step 2 - Determine what IS known

Step 3 - Find related conversion factors

Step 4 - Set up problems so that the un-needed units will cancel each other

Step 5 - DO THE MATH!!!!

Apr 26 - 8:17 AM