

## Conversions

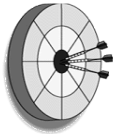
And Density Problems

## Accuracy vs. Precision

- \_\_\_\_\_ – How close you are to the correct answer
- \_\_\_\_\_ – How close your answers are together

## For Example...

- Let's say we had the following dart board

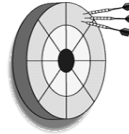


Is the accuracy good or bad? \_\_\_\_\_

Is the precision good or bad? \_\_\_\_\_

## Try this one

- Let's say we had the following dart board

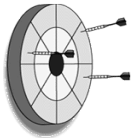


Is the accuracy good or bad? \_\_\_\_\_

Is the precision good or bad? \_\_\_\_\_

## Try this one

- Let's say we had the following dart board



Is the accuracy good or bad? \_\_\_\_\_

Is the precision good or bad? \_\_\_\_\_

## Dimensional Analysis

- \_\_\_\_\_ is just a big word for going from one unit to another.
- Have you ever converted inches into feet or years into days?
- If so, then you have done dimensional analysis

## Dimensional Analysis

- Dimensional Analysis** – method of problem-solving that focuses on \_\_\_\_\_
- \_\_\_\_\_ – a ratio of equal values used to go from one unit to another
  - Example: 1 foot = 12 inches
  - Can be written as  $\frac{1 \text{ foot}}{12 \text{ inches}}$

## Rules for Dimensional Analysis

- ALWAYS** start with the given!!!
- Draw a multiplication sign and a line
- Place the unit to be canceled on the bottom
- Place a conversion factor on the line you have drawn
- Cross out units and see what you have left.
- You must have one on top & one on the bottom

Let's try an example...

Let's convert 32.5 inches to feet.

Try this example...

- How many seconds are in 82.95 minutes?

What if you need to Change 2  
Units?

Convert 65 miles per hour to kilometers  
per second

*(0.625 miles = 1 Km)*

Conversions with Prefixes

- Conversions with prefixes are done in exactly the same manner
- You just have to know the prefixes

## Prefixes

Prefix	Symbol	Value
Giga	G	$1 \times 10^9$
Mega	M	$1 \times 10^6$
Kilo	K	$1 \times 10^3$
Deci	d	$1 \times 10^{-1}$
Centi	c	$1 \times 10^{-2}$
Milli	m	$1 \times 10^{-3}$
Micro	$\mu$	$1 \times 10^{-6}$
Nano	n	$1 \times 10^{-9}$
Pico	P	$1 \times 10^{-12}$
Femto	f	$1 \times 10^{-15}$

## Rules with Prefixes

- The rules are the same...
- Start with the given
- Place the cross out unit on the bottom
- Place conversion unit on top
- Keep crossing out until you get what you want

## A few differences

- Always remember that \_\_\_\_\_ will go with your Prefix
- The number with in \_\_\_\_\_ will go with your base unit
- You can only go from a \_\_\_\_\_ to a \_\_\_\_\_ unit

## Let's try one

- Convert 100 nm into m

### Try this one...

- Convert 785 mm to km

### Temperature Conversions

- The three units for measuring temperature are...
  - Celsius
  - Fahrenheit
  - Kelvin



### To Convert Among Temperatures Use These Formulas

- $^{\circ}\text{F} = 1.8\ ^{\circ}\text{C} + 32$
- $^{\circ}\text{C} = 0.56 (^{\circ}\text{F} - 32)$
- $\text{K} = ^{\circ}\text{C} + 273$

### Try these examples

- Convert 35  $^{\circ}\text{C}$  to Kelvin

### Example

- Convert 55 °C to °F

### Example

- Convert 95.8 °F to °C

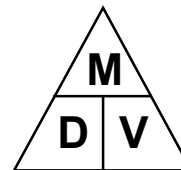
### Example

- Convert 75.0 °F to Kelvin

### Density

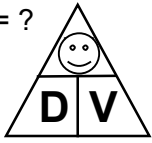
- Density - mass per unit volume (g/cm<sup>3</sup>)

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



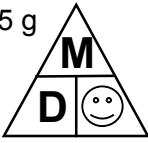
## Density

- An object has a volume of  $825 \text{ cm}^3$  and a density of  $13.6 \text{ g/cm}^3$ . Find its mass.

GIVEN:	WORK:
$V = 825 \text{ cm}^3$ $D = 13.6 \text{ g/cm}^3$ $M = ?$	
	

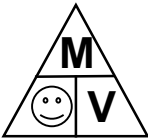
## Density

- A liquid has a density of  $0.87 \text{ g/mL}$ . What volume is occupied by  $25 \text{ g}$  of the liquid?

GIVEN:	WORK:
$D = 0.87 \text{ g/mL}$ $V = ?$ $M = 25 \text{ g}$	<hr style="width: 50%; margin: 0 auto;"/>
	

## Density

- You have a sample with a mass of  $620 \text{ g}$  & a volume of  $753 \text{ cm}^3$ . Find density.

GIVEN:	WORK:
$M = 620 \text{ g}$ $V = 753 \text{ cm}^3$ $D = ?$	<hr style="width: 50%; margin: 0 auto;"/>
	

## Density

- Density is that it is an \_\_\_\_\_ property
- That means that the density of a substance is the same regardless of \_\_\_\_\_
- If you find the density of an unknown material, you can look it up in a density chart to find its identity

## Density

- I have a block that measures 5.25 cm by 2.25 cm by 8.50 cm.
- I weigh the block and find its mass to be 5.85 g
- Calculate the density of the block in  $\text{g/cm}^3$

## What if you have an odd shaped object?

- The density of an odd shaped object can be found by the same equation
- To find the mass, you just \_\_\_\_\_ the odd shaped object
- To find the volume, you place water in a \_\_\_\_\_ and get an initial volume
- Then you place the object into the \_\_\_\_\_.
- The volume of the object is the \_\_\_\_\_ in the two volumes

## For example

- A chunk of metal has a mass of 5.25 g. It is placed in a graduated cylinder containing 25.0 ml of water. Once the metal is placed in the graduated cylinder, the water rises to 38.2 ml. What is the density of the metal?