Purpose:

What are conversion factors?
What is dimensional analysis?

WARMUP :

Dimensional Analysis is a way to multiply a measurement by ratios so that you create a new measurement, with new units.

Conversion factors are formed by taking two related numbers and putting them into a ratio

1) **Scientific notation has sig fig rules:**

$$9.010, \times 10^{99}$$

← these are significant

2) **In chemistry, avoid using ^ and ( ).**

use EXP

or

EE

or

10^x

depending on your brand of calculator

3) **How to mark-up a story problem before putting it into dimensional analysis**

(See today's handout)

#1

Step One: Underline the starter unit (the unit that is not paired with another unit. Circle pairs of units. Draw a box around the goal unit.

Your school club sold 600 tickets to a chili supper. The chili recipe for 10 persons requires 2 teaspoons of chili powder. How many teaspoons of chili powder will you need altogether?

Step Two: Write down the important info here.

What's the starter number?

600 tickets

What is the goal unit?

teaspoons

Write all the 'for every' statements that will make useful conversion factors.

for every 10 persons you need 2 teaspoons

Step Three: Solve below using dimensional analysis. Write words before you write numbers.

$$600 \text{ tickets} \times \left(\frac{2 \text{ teaspoons}}{\text{tickets}} \right) = \text{tea spoons}$$

$$600 \text{ tickets} \times \left(\frac{1 \text{ person}}{1 \text{ ticket}} \right) \times \left(\frac{2 \text{ teaspoons}}{10 \text{ person}} \right) = 120 \text{ tea spoons} \approx 100 \text{ tea spoons}$$

#2

Step One: Underline the starter unit (the unit that is not paired with another unit. Circle pairs of units. Draw a box around the goal unit.

How many seconds old is the person in this class with the most school spirit?

Step Two: Write down the important info here.

What's the starter number?

15.9 years

What is the goal unit?

Seconds

Write all the 'for every' statements that will make useful conversion factors.

1 year is 365.25 days
1 day is 24 hours.
1 hour = 3600 seconds

Step Three: Solve below using dimensional analysis. Write words before you write numbers.

$$15.9 \text{ yrs} \times \left(\frac{365.25 \text{ days}}{1 \text{ yrs}} \right) \left(\frac{24 \text{ hrs}}{1 \text{ day}} \right) \left(\frac{3600 \text{ sec}}{1 \text{ hrs}} \right) = \text{seconds}$$

50 1765840

500 000 000 seconds

#3

Step One: Underline the starter unit (the unit that is not paired with another unit. Circle pairs of units. Draw a box around the goal unit.

Devon is planning a party for 15 people. She wants to order enough pizza so that every person can have 4 slices. When he calls the pizza place, they tell Devon that a large pizza is cut into 12 slices and costs $14.78. How much money will Devon need in order to feed all of his guests?

Step Two: Write down the important info here.

What's the starter number?

15 people

What is the goal unit?

dollars

Write all the 'for every' statements that will make useful conversion factors.

for every 12 slices we pay $14.78

for one person we need 4 slices

Step Three: Solve below using dimensional analysis. Write words before you write numbers.

$$15 \text{ people} \left(\frac{4 \text{ slices}}{1 \text{ people}} \right) \left(\frac{14.78 \text{ dollar}}{12 \text{ slice}} \right) = 73.90 = \text{dollars}$$

#4

Step One: Underline the starter unit (the unit that is not paired with another unit. Circle pairs of units. Draw a box around the goal unit.

If Thorium has a density of 11.7 grams per 1 cm3, what is the volume, in cm3 of a 483.0 gram piece of thorium?

Step Two: Write down the important info here.

What's the starter number?

483.0 grams

What is the goal unit?

Cm^3

Write all the 'for every' statements that will make useful conversion factors.

For every 11.7 grams there is 1 cm3

Step Three: Solve below using dimensional analysis. Write words before you write numbers.

$$483.0 \text{ grams} \times \left(\frac{1 \text{ cm}^3}{11.7 \text{ grams}} \right) = 41.3 \text{ cm}^3$$