Unit Conversion Inquiry WS
Chemistry

Name _____

Block _____

Purpose: To be able to take measurements with a specified units and converting it to another unit of measurement.

Part 1 – Equivalence Statements:

An equivalence statement is when two values are set to equal each other

- Equivalence statements can be written out in a form of a sentence.
    Example: The gas station is currently selling gas at $2.00 per gallon

- The sentence can then be written out using an equal sign in between the two values
    Example: 1 gallon = $2.00

Sentence	Equivalence Statement
She walked 1 mile in 18 minutes	1 mile = 18 minutes
A hamburger at McDonalds costs $1.50	1 hamburger = $1.50
There are 500 sheets of paper in 1 ream of paper	1 ream = 500 sheets

MODEL 1: *During a car trip, the car travelled 90 miles. The trip took 75 minutes to complete. According to the gauge, the car trip used up 3 gallons of gasoline. The driver took 1 stop for a bathroom/stretch break during the trip. He noticed that he played 28 songs by the end of the trip.*

Write at least 5 equivalent statements from the description above.

1 trip =   1 trip =

1 trip =   1 trip =

1 trip =

Here are 3 other ratio relationships that we can obtain from the model:

90 miles = 3 gallons of gas   90 miles = 1 bathroom break   75 minutes = 28 songs

Write 4 other such relationships that you can obtain from the Model 1.

Part 2 – Conversion Factors:

A **conversion factor** *changes* a number of a specified unit to a number with a different unit.

Conversion factors are typically written in a fraction. Equivalent statements can be written as a conversion factor. There are two ways to write the conversion factor for an equivalent statement

Sentence	Equivalence Statement	Conversion Factor 1	Conversion Factor 2
She walked 1 mile in 18 minutes	1 mile = 18 minutes	$\dfrac{1\ mile}{18\ minutes}$	$\dfrac{18\ minutes}{1\ mile}$
A hamburger at McDonalds costs $1.50	1 hamburger = $1.50	$\dfrac{1\ hamburger}{\$1.50}$	$\dfrac{\$1.50}{1\ hamburger}$
There are 500 sheets of paper in 1 ream of paper	1 ream = 500 sheets	$\dfrac{1\ ream}{500\ sheets}$	$\dfrac{500\ sheets}{1\ ream}$

Using the scenario from Model 1, choose four equivalence statement you came up with in part 1 and the 2 conversion factors for the statement in the table below.

Equivalence Statement	Conversion Factor 1	Conversion Factor 2

Critical Questions:

1. How long does it take to drive 90 miles?

2. How long does it take to drive 180 miles?

3. How many miles can you drive on 3 gallons of gas?

4. How many miles can you drive on 1 gallon of gas?

Part 3 – Unit Conversion & Conversion factors:

Unit conversions = Begin with one unit and you want to express that value in a different unit.

Conversion factors are used when converting one unit to another. It is possible that one or more conversion factors are required to convert to the wanted unit. Using **conversion factors** to solve a problem is called **Dimensional Analysis**.

MODEL 2:

#s	$16\,x\,\dfrac{17}{8}\,x\,\dfrac{3}{17}=?$	$16\,x\,\dfrac{\cancel{17}}{8}\,x\,\dfrac{3}{\cancel{17}}=?$	$16\,x\,\dfrac{3}{8}=6$
Units	$days\,x\,\dfrac{hours}{days}\,x\,\dfrac{min}{hours}$	$\cancel{days}\,x\,\dfrac{\cancel{hours}}{days}\,x\,\dfrac{min}{\cancel{hours}}$	min
#s & units	$2.5\,days\,x\,\dfrac{24\,hrs}{1\,day}\,x\,\dfrac{60\,min}{1\,hr}$	$2.5\,\cancel{days}\,x\,\dfrac{24\,\cancel{hrs}}{1\,\cancel{day}}\,x\,\dfrac{60\,min}{1\,\cancel{hr}}$	$2.5\;x\,\dfrac{24}{1}\,x\,\dfrac{60\,min}{1}=3600\,min$

Use the examples in the table above to complete the activities for the one-step, two-step and multi-step conversions.

One-Step Conversion: *Convert 5.67 cm to inches*

$1\ inch = 2.54\ cm$		← Equivalence Statement
$\dfrac{1\ inch}{2.54\ cm}$	$\dfrac{2.54\ cm}{1\ inch}$	← The 2 Conversion Factors

Using the conversion factors above, fill in the box below that correctly converts 5.64 cm to inches. Like Model 2, show the cancellation and calculate the final answer with the correct unit.

$$5.64\ cm\ \ X\ \boxed{}\ =$$

Two-Step Conversion: *Convert 5.67 m to inches*

$1\ inch = 2.54\ cm$		$1\ m = 100\ cm$	
$\dfrac{1\ inch}{2.54\ cm}$	$\dfrac{2.54\ cm}{1\ inch}$		

Write the conversion factors for the second equivalence statement. Using the conversion factors above, fill in the boxes below that correctly converts 5.64 m to inches. Like Model 2, show the cancellation and calculate the final answer with the correct unit.

$$5.64\ m\ \ X\ \boxed{}\ X\ \boxed{}\ =$$

Multi-Step Conversion: *Convert 2.1 weeks to seconds*

| *1 week = 7 days* | *1 day = 24 hrs* | *1 hr = 60 min* | *1 min = 60 s* |

$$2.1\,wks \times \frac{}{} \times \frac{}{} \times \frac{}{} \times \frac{}{} =$$

Practice Unit Conversion:

Fill in the proper conversion factor to complete the problem. Then, show the cancellation and calculate the final answer with the correct unit.

1. Convert 25.9 mL to ounces (oz)
       1 oz = 29.57 mL

$$25.9\,mL \times \frac{}{} =$$

2. How many grams are in 1.78 tons?
       1 ton = 2000 lbs   1 kg = 2.2 lbs   1 kg = 1000 g

$$1.78\,tons \times \frac{}{} \times \frac{}{} \times \frac{}{} =$$

3. Convert 5.33 miles to inches.
       1 mile = 5280 ft   1 ft = 12 inches

$$5.33\,mi \times \frac{}{} \times \frac{}{} =$$

4. How many miles are in 2500 inches?

$$2500\,in \times \frac{}{} \times \frac{}{} =$$