# Activity 1 - Math and the Calculator Worksheet

Section Date

#### **Exercise A. Measured and Exact Numbers**

Circle "M" or "E" to indicate whether each of the following numbers is measured or exact:

5 books	ME	12 roses	ME
5 lb	ME	12 inches in 1 foot	ME
9.25 g	ME	361 miles	ME
0.035 kg	ME	100 cm in 1 m	ME

#### **Exercise B. Scientific Notation**

Write the following numbers in scientific notation:

4,450,000	4.45 × 106	0.00032	3,2×10-4
38,000	3.8 × 104	25.2	2.52 × 10
0.0000000021	2.1 × 10-9	0.0505	5.05 × 102

Write the following as standard numbers:

$4 \times 10^2$	400	$3 \times 10^{-4}$	0.0003
$5 \times 10^3$	5000	$8.2 \times 10^{-3}$	0.0082
$3.15 \times 10^{5}$	315000	$2.46 \times 10^{-6}$	0.0000246

# Exercise C. Significant Figures

State the number of significant figures in each of the following measured quantities:

4.5 m	2 Sig figs	204.52 g	5 Sig tigs
0.0004 L	1 Sig fig	625,000 mm	3 sigfigs
850 lb	2 Sig figs	34.80 km	4 sig figs
$2.50 \times 10^{-3} \text{ L}$	3 Sigfigs	$8 \times 10^5$ g	1 Sig fig
)	0 1		' /

no decimal on value : Zero not significant -9-

#### Exercise D. Rounding Off

Round off each of the following to the number of significant figures indicated. Don't forget placeholder zeros when necessary!

Three significant Figures

E.g.: 0.4108 g 143.63212 mi 532.800 ft 532.800 = 533000 ft  $5.448 \times 10^2 \text{ yrs}$   $5.448 \times 10^2 \times 10^2$ 

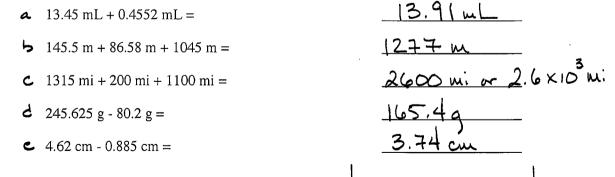
## Exercise E. Multiplication and Division

Do the following multiplication and division calculations. Give a final answer with the correct number of significant figures and the correct units. Units can cancel or multiply just like number factors.

E.g.: 
$$4.5 \text{ ergs} \times 0.281 \text{ in} = \frac{1.3 \text{ ergs in}}{0.1184 \text{ cm} \times 8.00 \text{ cm} \times 0.0345 \text{ cm} = \frac{2}{(2.5 \times 10^4 \text{ m/s}) \times (5.0 \times 10^{-7} \text{ s})} = \frac{0.0321784 \text{ cm}^3}{(42.21)(1.45 \text{ atm})} = \frac{0.0125 \text{ m}}{(4.8 \text{ mol } \times 0.0821 \frac{1.45 \text{ atm}}{\text{mol } \times 1.00 \text{ k}})} = \frac{1.3 \text{ ergs in}}{0.0125 \text{ m}} = 0.0327 \text{ cm}^3$$

#### Exercise F. Addition and Subtraction

Do the following addition and subtraction calculations. Give a final answer with the correct number of significant figures and units.



#### **Questions and Problems**

1. How can you distinguish an exact number from a measured number?

In exact number is either a definition or counted whole number value. A measured number is obtained from a measurement with some sort of ruler or scale.

2. In the scientific community, the last digit in a measured number that is still significant is sometimes called the estimated digit. Circle or underline the estimated digit in each of the following measurements:

1.5 cm 4500 mi. 0.0782 m 42.50 g

- 3. Bill and Beverly have measured the sides of a rectangle. Each recorded the length as 6.7 cm and the width as 3.9 cm. When Bill calculates the area, he gives an answer of 26.13 cm<sup>2</sup>. However, Beverly gives her answer for the area as 26 cm<sup>2</sup>.
  - a. Give the most likely explanation for the difference between the two calculated answers despite the fact that both students used the same measurements.

6.7 xm × 3.9 cm = 26.13 cm² = 26 cm²

Bills Answer Beverly's Answer

Beverly is correctly applying the sigfig rules for multiplycation and correctly rounding her answer to two sig figs.

Bill is not rounding his answer and reporting its value incorrectly.

b. You are going to tutor Bill Historica complete control.

b. You are going to tutor Bill. Using complete sentences, describe how you would help him to understand why his answer is wrong and Beverly's is right.

The two measurements of 6.7 cm and 3.9 cm each have two sig figs. The area of the rectangle can only be as good, known to the same degree of uncertainty, as the values for the length and width. The area of the rectangle must be rounded to the same number of Sig Figs => two

26.13 cm² - 26 cm²

## Measurements in Your Daily Life

4. Throughout a typical day, list at least eight numbers (and units) you might use such as measurements, prices, definitions, cooking quantities, gasoline purchases, prescription dosages, etc. Identify each number as exact or measured. Explain your choice. (Did you use a measuring tool, or did you count out something, or use a definition?)

Number used	Type of Number	Explanation
325 mg	Measured	number of my of asperin in a tablet
3 Tablets	_ Exact	number of asperin tablets consumed after that
16 fl 02	Measured	Amont of Lemon Aid consumed after game
4.0 mi	Measured	Distance to roller rink
-3.2°C	Measured	Temp of ice used on ankle after game
\$ 36.73	Exact	Amount of Woney Spent on Beer by toam
2 goals	Exact	number of goals our team won by
1 st place Troply	Exact	priceless!

5. In the list above, were the numbers you used mostly measured numbers, or mostly exact numbers?

50/50 => Though most people will find the majority to be measured numbers.

6. List the names and abbreviations of five units (metric or American) of measurement you used. Give the property measured (weight, mass, volume, distance, etc.)

Unit of Measurement	Abbreviation	Property Measured
<u>Milligram</u>	_wa	Mass SI
fluid Ounce	floz	Volume English
Wile:	<u> </u>	<u>distance</u> English
degree Celcius	<u> </u>	Temperature SI
dollar	#	amount of Curency