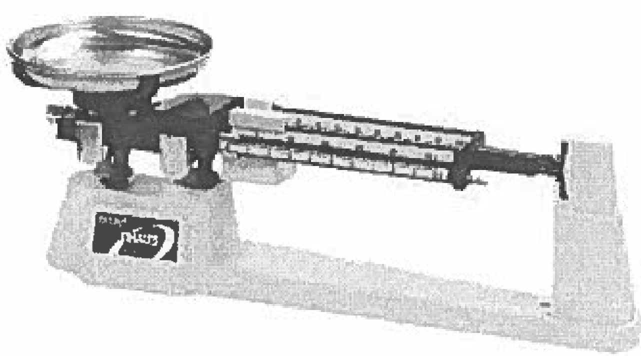
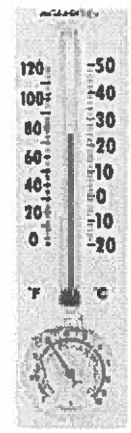
Regents Chemistry





Unit 1: Metrics, Math and Measurement

Name ______________________________ Date ____________ Class ___________

Explore

Paper Clip Patterns

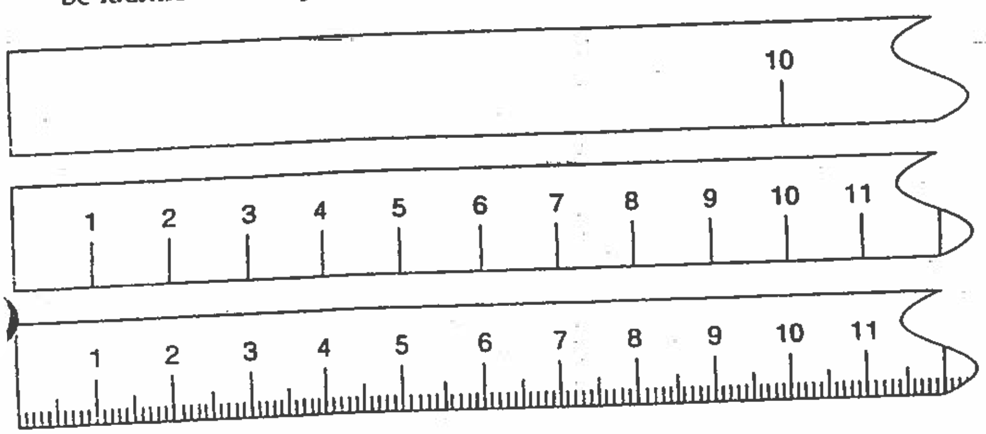
In this activity you will explore why measurements involve a degree of uncertainty.

Materials (per student)

paper clip

Procedure

1. Measure the length of a paper clip on each ruler pictured below. The measurements will not be identical. Write your answers in the space provided.



length of paper clip

__________ cm

length of paper clip

__________ cm

length of paper clip

__________ cm

Questions

1. Were all of your measurements identical? Explain.

____

____

____

2. Which measurement required the greatest amount of estimation? Explain.

____

____

____

3. How do your measurements indicate this difference in the degree of estimation needed?

____

____

____

SIGNIFICANT FIGURES

Name ____________________

A measurement can only be as accurate and precise as the instrument that produced it. A scientist must be able to express the accuracy of a number, not just its numerical value. We can determine the accuracy of a number by the number of significant figures it contains.

1) All digits 1-9 inclusive are significant.
   Example: 129 has 3 significant figures.
2) Zeros between significant digits are always significant.
   Example: 5,007 has 4 significant figures.
3) Trailing zeros in a number are significant <u>only</u> if the number contains a decimal point.
   Example: 100.0 has 4 significant figures.
   100 has 1 significant figure.
4) Zeros in the beginning of a number whose only function is to place the decimal point are not significant.
   Example: 0.0025 has 2 significant figures.
5) Zeros following a decimal significant figure are significant.
   Example: 0.000<u>470</u> has 3 significant figures.
   0.<u>47000</u> has 5 significant figures.

Determine the number of significant figures in the following numbers.

1. 0.02 ______
2. 0.020 ______
3. 501 ______
4. 501.0 ______
5. 5,000 ______
6. 5,000. ______
7. 6,051.00 ______
8. 0.0005 ______
9. 0.1020 ______
10. 10,001 ______

Determine the location of the last significant place value by placing a bar over the digit. (Example: $1.70\bar{0}$)

1. 8040 ____________________
2. 0.0300 ____________________
3. 699.5 ____________________
4. 2.000×10^{2} ____________________
5. 0.90100 ____________________
6. 90,100 ____________________
7. 4.7×10^{-8} ____________________
8. 10,800,000. ____________________
9. 3.01×10^{21} ____________________
10. 0.000410 ____________________

Name: ____

Introduction to Significant Figures

Rules:

1. Digits other than zero are always significant.
   - i. 96
   - ii. 61.4

2. There are three classes of zeros:
   - a. Sandwiched zeroes are found between other significant digits. They are ALWAYS significant.
     - i. 5.0029 ← the two underlined zeroes are significant.
   - b. Leading zeroes are found to the left of **ALL** of the nonzero digits. They are NEVER significant.
     - i. 0.072 ← the two zeroes in front aren't significant
   - c. Trailing zeroes are found to the right of **ALL** of the nonzero digits. They are only significant if the measurement has a decimal point.
     - i. 10.0 ← the two trailing zeroes are significant because there is a decimal point.
     - ii. 100.
     - iii. 1000 ← these three trailing zeroes are NOT significant because there is no decimal point.

Practice: Count the number of significant figures in each of the given measurements below.

1. 30.4 ml
2. 2700 cm
3. 5.10 g
4. 0.023 m
5. 7.0200 L
6. 0.04010 g
7. 3.00 g/mL
8. 2.700 m^2
9. 0.0304 ml
10. 51.0 m
11. 903.2 m
12. 90.3 °C
13. 900.0 km
14. 0.0090 ml
15. 0.0900 cm^3
16. 99.0 g
17. 0.0088 J
18. 0.049 K
19. 0.02 ml
20. 70.0 mm
21. 70 mm
22. 70. mm

Name: ____

Introduction to Significant Figures

Practice 2: How many significant figures do the following numbers have?

1) 1234 _____

2) 0.023 _____

3) 890 _____

4) 91010 _____

5) 9010.0 _____

6) 1090.0010 _____

7) 0.00120 _____

8) 3.4×10^4 _____

9) 9.0×10^{-3} _____

10) 9.010×10^{-2} _____

11) 0.00030 _____

12) 1020010 _____

13) 780. _____

14) 1000 _____

15) 918.010 _____

16) 0.00091 _____

17) 0.00390 _____

18) 8120 _____

19) 7.991×10^{-10} _____

20) 72 _____

Name: ____ Date: ____________

Math with Significant Figures

SIGNIFICANT FIGURES

1. **Give the number of significant figures for each of these numbers:**

a. 0.157 ____	e. 0.00607 ____	f. 3.0600 ____
b. 0.0230 ____	f. 16.54 ____	g. 56.000 ____
c. 2.500 ____	g. 0.0000291 ____	h. 8405 ____
d. 12,000 ____	h. 1.0060 ____	i. 932,800 ____

2. **Solve and express the answer with the correct number of significant figures:**

   a. ADD: 13.253 + 16.00 + 9.6 = __________

   b. SUBTRACT: 30,000. – 170.80 = _________

For Questions 3-6 below, select the answer that has the correct number of significant figures:

3. 5.22 m x 82.7 m =

   a. 431.694 m^2 b. 431.69 m^2 c. 431.7 m^2 d. 432 m^2

4. 0.0322 cm x 6.5 cm=

   a. 0.2 cm^2 b. 0.21 cm^2 c. 0.209 cm^2 d. 0.2093 cm^2

5. $\frac{4.08 \text{ mL}}{1.61 \text{ mL}}$ =

   a. 67 b. 66.9 c. 66.89 d. 66.885

6. $\frac{9.475 \text{ g}}{2.05 \text{ cm}^3}$ =

   a. 4.622 g/cm^3 b. 4.6219 g/cm^3 c. 4.62 g/cm^3 d. 4.6 g/cm^3

Name: ______________________________ Date: __________

Math with Significant Figures

Please solve the following problems and round to the correct number of significant figures.

1) 257.6 / 12.3	6) 8.71 x 0.0301
2) 50.2 / 1.3	7) 76.4 x 29.3
3) 7.895 x 3.4	8) 7.6 / 5.823
4) 0.0945 x 1.47	9) 850.0 x 7.61
5) 0.2 / 0.0005	10) 48.2 / 6.00

Name: ____________________ Chem

Significant Digit Worksheet

Give the number of significant digits in each of the following measurements:

1. 1278.50 ______	7. 8.002 ______	13. 43.050 ______
2. 120000 ______	8. 823.012 ______	14. 0.147 ______
3. 90027.00 ______	9. 0.005789 ______	15. 6271.91 ______
4. 0.0053567 ______	10. 2.60 ______	16. 6 ______
5. 670 ______	11. 542000. ______	17. 3.47 ______
6. 0.00730 ______	12. 2653008.0 ______	18. 387465 ______

Round off the following numbers to three significant digits:

19. 120000 ______	22. 4.53619 ______
20. 5.457 ______	23. 43.659 ______
21. 0.0008769 ______	24. 876493 ______

Perform the following operations giving the proper number of significant figures in the answer:

25. 23.4 x 14 ______

26. 7.895 + 3.4 ______

27. 0.0945 x 1.47 ______

28. 0.005 - 0.0007 ______

29. 7.895 / 34 ______

30. 0.2 / 0.0005 ______

31. (8.71 x 0.0301)/0.056 = ______

32. $(7.6 \times 10^{4})(5.823 \times 10^{-3})$ = ______

33. (4 x 972) + (76.4 x 29.3) – (12 x 7) =

34. $\frac{(72.67 - 72.63) \times (4.2694)}{(9.72 + 0.01)}$ =

35. $\frac{4.1 \times 10^{-3} - 6.9 \times 10^{-2}}{7.2 \times 10^{-6} + 8.943 \times 10^{4}}$ =

36. $\frac{10,000,000 \times 0.0003845 \times 4.55}{4.331 \times 10^{-8}}$ =

Write each number in scientific notation.

33. 0.07882 =	34. 0.00002786 =
35. 87200 =	36. 74171.7 =
37. 450=	38. 118000 =
39. 0.0000085 =	40. 0.000000664 =
41. 0.00000272338 =	42. 770 =
43. 62360 =	44. 0.000044547300 =
45. 500260 =	46. 0.0000087038 =

Name : ______________________ Score : __________

Teacher : ______________________ Date : __________

Solve the Problems and Round Accordingly.

1)	9050 ÷ 7.38 = ________	11)	5.519 x 9.3 x 530 = ________
2)	3.80 x 4.31 x 900 = ________	12)	509 ÷ 1.286 = ________
3)	777 x 4.71 x 3500 = ________	13)	400 ÷ 63.4 = ________
4)	5800 ÷ 1.9 = ________	14)	1.5 x 600 = ________
5)	7.74 x 6 = ________	15)	170 ÷ 5.61 = ________
6)	0.067 x 4.92 = ________	16)	29.9 x 3.134 = ________
7)	0.03 x 0.006 = ________	17)	0.2 x 0.02 x 2040 = ________
8)	82.98 x 100 = ________	18)	306 ÷ 79.8 = ________
9)	0.90 x 0.0031 x 401 = ________	19)	4.75 x 600 x 6050 = ________
10)	0.003 x 49.2 = ________	20)	504 ÷ 3.20 = ________

SCIENTIFIC NOTATION

Name ____________________

Scientists very often deal with very small and very large numbers, which can lead to a lot of confusion when counting zeros! We have learned to express these numbers as powers of 10.

Scientific notation takes the form of $M \times 10^n$ where $1 \leq M < 10$ and "n" represents the number of decimal places to be moved. Positive n indicates the standard form is larger than zero whereas negative n would indicate a number smaller than zero.

Example 1: Convert 1,500,000 to scientific notation.

We move the decimal point so that there is only one digit to its left, a total of 6 places.

$$1{,}500{,}000 = 1.5 \times 10^6$$

Example 2: Convert 0.000025 to scientific notation.

For this, we move the decimal point 5 places to the right.

$$0.000025 = 2.5 \times 10^{-5}$$

(Note that when a number starts out less than one, the exponent is always negative.)

Convert the following to scientific notation.

1. 0.005 = ____________________
2. 5,050 = ____________________
3. 0.0008 = ____________________
4. 1,000 = ____________________
5. 1,000,000 = ____________________
6. 0.25 = ____________________
7. 0.025 = ____________________
8. 0.0025 = ____________________
9. 500 = ____________________
10. 5,000 = ____________________

Convert the following to standard notation.

1. 1.5×10^3 = ____________________
2. 1.5×10^{-3} = ____________________
3. 3.75×10^{-2} = ____________________
4. 3.75×10^2 = ____________________
5. 2.2×10^5 = ____________________
6. 3.35×10^{-1} = ____________________
7. 1.2×10^{-4} = ____________________
8. 1×10^4 = ____________________
9. 1×10^{-1} = ____________________
10. 4×10^0 = ____________________

Name____________________________

Scientific Notation Practice

Convert the following to scientific notation:

1) 45,700 ____________________

2) 23 ____________________

3) 24,212,000 ____________________

4) 21.9 ____________________

5) 321 ____________________

6) 1492 ____________________

7) 314159 ____________________

8) 0.12011 ____________________

9) 0.009 ____________________

10) 0.9 ____________________

11) 0.000665 ____________________

12) 0.00332 ____________________

13) 0.119 ____________________

14) 0.2713 ____________________

15) 6022 ____________________

Convert the following numbers in scientific notation to expanded form:

26) 3.825×10^{3} ____________________

27) 6.3×10^{4} ____________________

28) 2.3×10^{-2} ____________________

29) 4.44×10^{-6} ____________________

30) 7.121×10^{9} ____________________

31) 1.2×10^{-1} ____________________

32) 1.8×10^{2} ____________________

33) 8.1×10^{-4} ____________________

34) 6.7×10^{5} ____________________

35) 3.4×10^{7} ____________________

Name____________________________

Scientific Notation Practice

Make the following conversions:

1) 3.4 liters to milliliters

2) 876 millimeters to meters

3) 78,999 milligrams to grams

4) 0.9 centigrams to grams

5) 112 meters to millimeters

6) 45 meters to centimeters

7) 11.7 grams to kilograms

8) 0.0009 kiloliters to liters

9) 44 centimeters to meters

10) 277 kilograms to grams

Convert the following to scientific notation:

11) 45,700

12) 0.009

13) 23

14) 0.9

15) 24,212,000

16) 0.000665

 For chemistry help, visit http://www.chemfiesta.com

Name______________________________

Scientific Notation Practice

Convert the following to scientific notation:

17) 21.9

18) 0.00332

19) 321

20) 0.119

21) 1492

22) 0.2713

23) 314159

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32) 1.8×10^{2}

33) 8.1×10^{-4}

34) 6.7×10^{5}

35) 3.4×10^{7}

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Name________________________________

(R) Factor Label Method

Frequently Asked Factor-Label Questions:

Why are we doing this?

Factor Label is a method for solving problems. It gives us a neat and organized method to solve problems. You can use this method in chemistry, math, shopping, building, cooking and home improvement/maintenance.

How do we do this?

Factor label entails connecting information that you know or are given with information that you need to find. It also involves developing a skill in writing conversion factors. A CONVERSION FACTOR is a fraction where the numerator is equal to the denominator, except they are in different units.

All factor label problems involve the following basic approach:

 # what you want to find = what you know (given) x <u>the fraction(s) you need to get your answer</u>
AKA conversion factor

Example: How many feet are in 56 inches?

$$\# \text{ ft} = 56 \text{ in} \times \frac{1 \text{ ft}}{12 \text{ in}} = 4.6667 \text{ ft} = 4.7 \text{ ft}$$

The fraction that has been highlighted is known as a CONVERSION FACTOR The CONVERSION FACTOR is derived from the relationship between the unit you know and what you are trying to find. For example, 1 foot = 12 inches; therefore, you set up the fraction with the "find" unit value in the numerator and the "given" or "known" unit value in the denominator

Practice Problem #1: How many liters are in 156.2 milliliters?

Practice Problem #2: How many centimeters are in 9.85 meters?

What seems to be the key idea when determining which value goes in the numerator and which value goes in the denominator? ________________________

Practice Problem #3: How many meters are in .456 kilometers?

Practice Problem # 4: How many hours are in 3 days?

Self –Test: Use the factor label method to perform the following conversions. Even if it is a problem that you can solve mentally, it is important to practice the process.

For mass: 1 gram = 1000 milligrams 1 gram = 100 centigrams 1000 gram = 1 kilograms For volume: 1 liter = 1000 milliliters 1 liter = 100 centiliters 1000 liter = 1 kiloliters 1 milliliter = 1 cubic centimeter (cm^3)	For length: 1 meter = 1000 millimeters 1 meter = 100 centimeters 1000 meter = 1 kilometers For time: 1 year = 365 days 1 leap year = 366 days 1 day = 24 hours 1 hour = 60 minutes 1 minute = 60 seconds 1 second = 1000 milliseconds

Find the number of:

1. grams in 355 milligrams
2. centimeters in 245 meters
3. liters in 885 milliliters
4. kilograms in 352 grams
5. minutes in 24 hours
6. seconds in 101 minutes
7. meters are in 12 kilometers
8. milliseconds are in 45 seconds (1000ms = 1s)
9. centiliters in 6.72 liters
10. millimeters there are in 0.25 meters

Name:______________________________________Date:__________Period____

Factor Label (dimensional analysis)

One you have mastered the skill of writing conversion factors and solving basic factor label problems, you can apply those skills to more complex problems. Use the following conversion information to solve the problems below.

1 gallon =3.78 L	1 mile = 1609.34 m
1 lb = 454 g	1 calorie= 4.184 joules
1 inch= 2.54 cm	1L = 1000 ml
1 fathom = 1.288 meters	1 mile = 5280 feet

1. Clara caught a fish in 750 fathoms of water. How many kilometers deep was the fish?

2. The GC Turkey Trot is a 5 miles long. How many kilometers is this race?

3. The GCTA Race for a Cure is a 5K race. What is the distance in feet that this race entails?

4. My car holds approximately 15 gallons of gasoline. Even though my dad always told me to never let the fuel drop below half of a tank, I have, at times, pulled into the gas station on Empty. How many milliliters will I be putting in my car to fill the tank if it is, indeed, completely empty?

5. A double cheeseburger from Shake Shack has 770 calories. The regular fries have 470 calories and the concrete vanilla shake has 560 calories. If you decide to eat that entire meal, how many joules of energy have you consumed?

Name_________________________________ Date_______________

Using the Factor-Label Method

Unit Conversion Table

For length:	For mass:	For energy:	For volume:
1 inch= 2.54 cm	1 lb= 454 grams	1 calorie= 4.184 joules	1 gallon= 3.78 L
1 fathom= 1.9 m			1 L = 1000 ml
1 mile= 1.6 km			

1. Lebron James is 6 ft 8 inches tall and weighs 250 pounds.
   a. What is his height in centimeters?

   b. What is his weight in grams?

2. A plate of cheese fries has 1200 calories. How many joules of energy are in one plate of cheese fries?

3. **Your car holds about 15 gallons of gasoline. How many milliliters of gas do you pump when you fill up?

4. Clara caught a fish in 75 fathoms of water. How deep was the fish in meters?

5. The school is holding a race where people will run 8 miles. How many kilometers long is the race?

6. Baby Kelly weighs 8 pounds. What is the baby's weight in grams?

Chemistry Unit 1 Worksheet Period: ______ **Name:** ____________________

Factor Label Conversions

Convert each of the measurements given to the new unit stated **using the factor label method** (dimensional analysis). **Show all work including rewriting the given.**

All conversion factors have infinite #'s of S.F.

Conversion Factors

1 lb= 4.45 Newtons 1 lb= 0.454 kg 1 oz= 29.6 ml 1 in= 2.54 cm 1 mile = 5280 ft

1 mi = 1609 m

Answer before rounding Rounded for SF

One step conversions:

1. 26 cm to m. Table C (10^{-2} m = 1 cm) ____________ ____________

2. 4 hr to min ____________ ____________

3. 3.25 km to m ____________ ____________

4. 5 ft to in ____________ ____________

5. 130 lb to N ____________ ____________

6. 130 lb to kg ____________ ____________

7. 44 fl. oz. to mL ____________ ____________

Multi-step conversions:

1. 26 cm to ft.

2. 16 lb to g

3. 1 yr to s

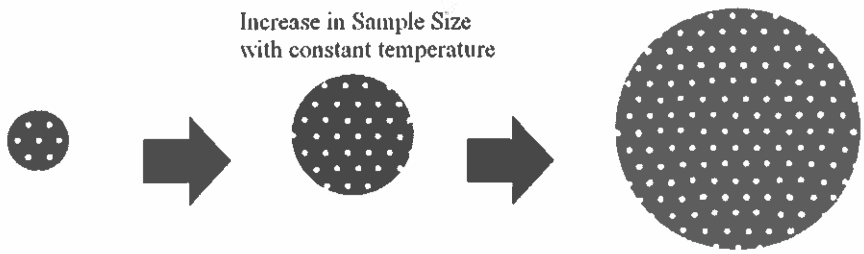
4. 3.5 mi to km

Name: ____ Date: ___________

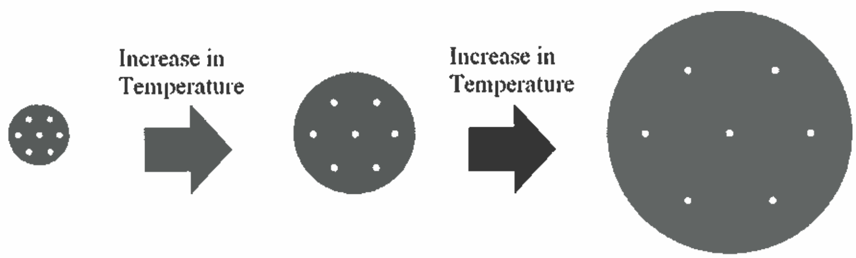
Density, Percent Error and Temperature Conversions

DENSITY

- Density is a measure of how close together particles are in a substance
- Density is an internal property that **DOES NOT CHANGE** with sample size.



- Density can be affected by a change in temperature because this changes the spacing between particles.
  - Increase in temperature – decrease in density
  - Increasing temperature causes molecules to spread apart.



The formula for density can be found on Table T in your Reference Tables. Write the formula for percent error below. Be sure to label the variables.

PERCENT ERROR

- **Percent error:** the percent that a measured value differs from the accepted value
- Used to show the difference between an accepted value and an experimental value at the end of a lab experiment

The formula for percent error can be found on Table T in your Reference Tables. Write the formula for percent error below:

Name: ____ Date: ___________

Density, Percent Error and Temperature Conversions

Questions:

1. A metal has a mass of 3.225 grams and a volume of 0.360 mL. What is the density of this metal? (Record your answer to the correct number of significant figures)

2. Based on the above density value, what precious metal is this according to Reference Table S? (Hint: precious metals are either platinum, gold, silver or copper)

3. Calculate the percent error comparing the measured value for density calculated in question 1 and compare it to the accepted value of density provided in Table S.

4. A graduated cylinder is filled with water to a level of 40.0 mL. When a piece of copper is lowered into the cylinder, the water level rises to 63.4 mL.

   a) What is the volume of the copper sample?

   b) If the density of the copper is 8.96 g/cm3, what is its mass?

5. What is the volume of a pure silver coin that has a mass of 14.0g? (Record your answer to the correct number of significant figures)

6. Different kinds of wood have different densities. The density of oak wood is generally 0.70 g/ml. If a 35.0 ml piece of wood has a mass of 25.0 g, is the wood likely to be oak?

Name: ____ Date: ___________

Density, Percent Error and Temperature Conversions

7. A student measures the density of water to be 0.97 g/mL. The actual value is 1.00 g/mL. Calculate the student's percent error. (Record your answer to the correct number of significant figures)

8. The student obtains a specific heat value of 4.86. Knowing the accepted value for the specific heat of water is 4.18 calculate the student's percent error.

9. The freezing point of water is 273.2 K, but it was measured at 250.1 K. What is the percentage error?

10. Convert the following temperatures using the formula from reference Table T.

a) 273 K= ______°C

b) 373 K= ______°C

c) 298 K= ______°C

d) 0 K= ______°C

e) 75°C= _______ K

f) -68°C= _______ K

g) 5°C= _______ K

h) 123°C= _______ K

Name:______________________________________ Date: ______________

Density Practice

1. What is the volume of a liquid with a density of 1.50 g/ml and a mass of 78.0 g?

2. What is the density of an object with a mass of 34.0 g and a volume of 13.00 mL?

3. What is the mass of an object with a density of 5.70 g/mL and a volume of 48.0 ml?

4. The density of Lead is 11.4 g/ml. If a sample of Lead has a mass of 91 g, what is the volume of this sample of lead?

5. What is the density of 253.23 g of water with a volume of 253.0 ml?

6. What is the mass of an object with a volume of 58 mL and a density of 2.4 g/mL?

7. Calculate the volume of a liquid that has a density of 0.7 g/mL and a mass of 19 g.

8. What is the mass of 34 mL of water with a density of 1.20 g/mL?

9. Determine the mass of an object with a volume of 82 cm^3 and a density of 4.1 g/ml.

10. What is the density of an object with a volume of 106 ml and a mass of 44 g?

Name ______________________________ Date __________

Unit 1A – Percent Error Problems Piersa

Answer the questions below using the percent error formula found on the back of your chemistry reference tables.

1. The actual freezing point of water is 273.2 K. The temperature measured by a student in a lab was measured at 250.1 K. What is the student's percent error?

2. The mass of a penny is 2.67 g, but it was measured at 2.55 g. What is the percent error?

3. The air pressure on a given day was 101.3 kPa, however your household barometer measured the pressure at 1001.3 kPa. What is the percent error?

4. The amount of heat released when 1 mole of CO_2 forms is 393.5 kJ. In a lab the value of heat released was measured at 378.2 kJ. Calculate the percent error.

5. Working in the laboratory, a student finds the density of a piece of pure aluminum to be 2.85 g/cm3. The accepted value for the density of aluminum is 2.699 g/cm3. What is the student's percent error?

6. A student experimentally determines the specific heat of water to be 4.29 J/g C°. He then looks up the specific heat of water on a reference table and finds that the actual value is 4.18 J/g C°. What is his percent error?

7. A student takes an object with an accepted mass of 200.00 grams and masses it on his own balance. He records the mass of the object as 196.5 g. What is his percent error?

8. The accepted of the atomic mass of an isotope of nickel is 57.9 g/mol. If a laboratory experimenter determined the mass to be 59.6 g/mol, what is the percent error?

9. The mass of one mole of oxygen gas is determined in an experiment to be 31.4 g/mol. Calculate the percent error, given that the actual value for this mass is 32.0 g/mol.

10. At 20° C, the solubility of potassium chloride is actually 34.7 grams per 100 cm^3 water. A laboratory experiment yielded 30.3 grams per 100 cm^3 water at the value. What is the percent error?

Name:_______________________________________ Date: ____________

Working with Formulas

Using Reference Table T, find the correct formula and solve each of the following problems. Some problems will need values to be converted to the required unit for the formula.

Density must be in grams per milliliter or centimeters cubed. (g/mL or g/cm^3)

Be sure to round for significant figures and include units in all of your answers!

When using percent error, the 100 is a fixed value and considered to have an infinite number of significant figures. Do not use the "100" when rounding the final answer using significant figures. Base your rounding off of the given values from the problem.

1. What is the volume of a liquid with a density of 1.500 g/ml and a mass of 78.00 g?

2. What is the density of an object with a mass of 34.0 g and a volume of 0.013 L?

3. During a lab experiment a student has a precious metal sample and must determine the metal's identity. The student knows that the metal is less reactive than hydrogen on reference Table J. The student finds the mass of the sample to be 255.15 g and the volume it occupies to be 24.3 cm^3.

   a. Based on **Reference Table J**, what are the possible metals the student could have?

   b. From the students measured data for mass and volume, find the density of the metal. Be sure to round the answer to the correct number of significant figures.

   c. Using **Reference Table S** and the density of the metal, please determine the identity of the metal.

   d. Based upon your answer to part b and part c, how close was the students measured value of density of the metal to the actual value listed in Table S.

4. The actual mass of a penny is 2.67 g, but it was measured at 2.55 g. Determine the percent error. Round your answer to the correct number of significant figures.

5. The density of Lead is 11.3 g/ml. If a sample of Lead has a mass of 91.0 g, how much space does the Lead occupy?

6. The amount of heat released when 1 mole of CO_2 forms is 393.5 kJ/mol. In a lab the value of heat released was measured at 378.2 kJ/mol. Determine the amount error in the measured value.

7. A student finished running a mile in gym class and takes their pulse. Their heart rate is 132 beats per minute (beats/min). How many beats per second is this?

8. A sample of water has a volume of 256.00 L.

a. How many **milli**liters is this?

b. If 1g=1ml, how many **milli**grams are contained in the 256.00 L sample of water?

9. What is the mass of an object with a volume of 58.0 mL and a density of 2.45 g/mL?

Name ______________________________

Packet 1 Review Sheet

1. Which milligram contains a total of four significant figures?

a. 0.30310mg b. 3010mg c. 3100.mg d. 30001mg

2. Which measurement contains three significant figures?

a. 0.05g b. 0.050 c. 0.056 d. 0.0563

3. Which measurement has the greatest number of significant figures?

a. 6.060mg b. 60.6mg c. 606mg d. 60600mg

4. Expressed to the correct number of significant figures, what is the correct sum of 3.04m + 4.134m + 6.1m?

a. 13m b. 13.3m c. 13.27m d. 13.274m

5. A cube has a volume of $8.0cm^3$ and a mass of 21.6g. What is the density, expressed to the correct number of significant figures?

a. $2.7g/cm^3$ b. $2.70g/cm^3$ c. $0.37g/cm^3$ d. $0.370g/cm^3$

6. What is the sum of 0.0421g + 5.263g + 2.13g to the correct number of significant figures?

a. 7g b. 7.4g c. 7.44g d. 7.435g

7. The mass of a solid is 3.60g and its volume is $1.8cm^3$. What is the density of the solid, expressed to the correct number of significant figures?

. $12g/cm^3$ b. $2.0g/cm^3$ c. $0.5g/cm^3$ d. $0.50g/cm^3$

8. A cubic object has sides with the lengths of 6.0cm, 3.0cm, and 2.0cm. The mass of the cube is 162.2g. What is its density to the correct number of significant figures?

a. $0.22g/cm^3$ b. $0.2219g/cm^3$ c. $4.5g/cm^3$ d. $4.505g/cm^3$

9. The volume of a gas is 22L. The density of the gas is 1.35 g/L. What is the mass of the gas sample, expressed to the correct number of significant figures?

a. 16.7g b. 17g c. 30. g d. 30.0g

10. What is the quotient of 8.01g divided by 3.127ml, expressed to the correct number of significant figures?

a. 2.6g/ml b. 2.56g/ml c. 2.5562g/ml d. 2.5616g/ml

11. What is the product of 2.324m x 1.11m, expressed to the correct number of significant figures?

a. $2.58m^2$ b. $2.5780m^2$ c. $2.5796m^2$ d. $2.57964m^2$

12. A student determines the density of an object to be 3.22 g/ml. If the accepted value is 3.87 g/ml, what is the student's percent error?

a. 16.4% b. 16.8% c. 21.5% 8.0%

13. Subtract the following numbers, and express your answer in the correct number of significant figures:

6.32g-14.1g=

a. 42.22g b. 42.23g c. 42.2g d. 42.02g

14. What is the difference of the following numbers, expressed to the correct numbers of significant figures?

9876.2g – 500.28g

a. 9375.9g b. 9375.92g c. 9376.0g d. 10376.42g

15. A student determines the mass of an object to 45.67g. What is the percent error if the accepted value is 43.25g?

a. 6.5% b. 5.6% c. 11.2% d. 9.2%

16. Convert the following numbers to scientific notation:

a) 4530000 ______________

b) 0.0078 ______________

c) 574000000 ______________

d) 0.023 ______________

17. Take the following numbers out of scientific notation:

a) 5.62×10^4 ______________

b) 4.01×10^{-8} ______________

c. 7.32×10^2 ______________

d. 2.22×10^{-5} ______________

18. Add the following using the rules for significant figures:

a) 35.7ml + 432.33ml + 5142.312ml = ______________

b) 0.027ml +0.0023ml = ______________

19. Determine the mass of the substance that has a density of 4.0g/ml and a volume of 2.55ml.

20. Determine the percent error for a student who measures the mass of an object to be 6.03g, and the volume to be 3.20ml with an accepted density value of 2.00g/ml.