

Name _____

Honors Chemistry Summer Assignment

Welcome to Honors Chemistry!!!!!!

PLEASE READ THIS WHOLE PAGE BEFORE YOU START.

During the course of the year we will be focusing on many topics dealing with significant figures, scientific notation and unit conversions using dimensional analysis.

Each of the topics has a “notes” page that explains how to do the problems. There are examples along with written explanations.

1. **Significant figures.** Ever do a math problem and get a really long answer and wonder should I round it? Well, significant figures tells you how to round off your answers. You **do not** have to show work on the one sig fig worksheet.
2. **Scientific Notation.** Read the directions and complete the 2 worksheets. You **do not** have to show work but your answer **MUST** have the same number of sig figs as the original number (the $\times 10^{\text{exponent}}$ is not included in rounding for significant figures).
3. **Algebra practice** You will need to use your pre-algebra skills.

Answers to Frequently Asked Questions.

This assignment will be due the first day of school. (start the year off right.... Have it done)

It will be your first grade of the first marking period. (so try your best)

It will be a test grade. (it should be worth something since you are taking time away from your summer to do it)

If you have any questions, you can email me at kscott@nazarehtacademyhs.org.

And lastly.... And most importantly.... This is HONORS CHEMISTRY. You are expected to do this work independently. You get out of it what you put into it.

We are going to have a great year and I look forward to working with you this fall. Enjoy your summer!

I _____ agree to do this assignment independently and that the work that is turned in is my own.

Name: _____

Date: _____ Period: _____

Scientific Notation

Scientific notation is often used in science to make working with very small or very large numbers easier. It is not practical to write out numbers like **0.00000000028** or **1,300,000,000** – scientific notation gives us another way to represent the same number.

A number given in scientific notation consists of three parts: the coefficient, the base, and the exponent.

Coefficients must be between **1.0 and 9.99999**, the base is always **x10**, and the exponent represents the number of places we have moved the decimal point in order to convert from standard form to scientific notation.

- For numbers less than 1, the exponent will always be negative.
- For numbers greater than 1, the exponent will always be positive.

Examples:

Example 1: If we convert **0.00000000028** to scientific notation, we must first get the coefficient within the accepted range. The coefficient here would be **2.8**. The base is always **x10**, so the only thing left is identifying the correct exponent. For numbers less than 1, the exponent will always be negative.

The exponent is equal to the number of decimal places we moved the decimal to get to our coefficient. For this example the exponent would be **-10**. The final answer would be written as **2.8 x10⁻¹⁰**

Example 2: Converting **1,300,000,000** to scientific notation will use the same rules; the only difference is the exponent will be positive since the original number is greater than 1. The coefficient would be **1.3**, base **x10** and the exponent would be **9**. The final answer would be **1.3 x10⁹**.

Convert the following numbers into scientific notation:

1) 3,400 _____

2) 0.000023 _____

3) 101,000 _____

4) 0.010 _____

5) 45.01 _____

Convert the following numbers into standard notation:

6) 2.30×10^4 _____

7) 1.76×10^{-3} _____

8) 1.901×10^{-7} _____

9) 8.65×10^{-1} _____

10) 9.11×10^3 _____

MATH HANDBOOK TRANSPARENCY WORKSHEET**2**

Operations with Scientific Notation

Use with Appendix B,
Operations with
Scientific Notation

1. Perform the following operations and express the answers in scientific notation.

a. $(1.2 \times 10^5) + (5.35 \times 10^6)$

(Remember your base should be between 1 and 10)

b. $(6.91 \times 10^{-2}) + (2.4 \times 10^{-3})$

c. $(9.70 \times 10^6) + (8.3 \times 10^5)$

d. $(3.67 \times 10^2) - (1.6 \times 10^1)$

e. $(8.41 \times 10^{-5}) - (7.9 \times 10^{-6})$

f. $(1.33 \times 10^5) - (4.9 \times 10^4)$

Remember your base should be between 1 and 10)

2. Perform the following operations and express the answers in scientific notation.

a. $(4.3 \times 10^8) \times (2.0 \times 10^6)$

b. $(6.0 \times 10^3) \times (1.5 \times 10^{-2})$

c. $(1.5 \times 10^{-2}) \times (8.0 \times 10^{-1})$

d. $\frac{7.8 \times 10^3}{1.2 \times 10^4}$

e. $\frac{8.1 \times 10^{-2}}{9.0 \times 10^2}$

f. $\frac{6.48 \times 10^5}{(2.4 \times 10^4)(1.8 \times 10^{-2})}$

Significant Figures

The **Significant Figures** of a number refer to those digits that have *meaning in reference to a measured or specified value*. Correctly accounting for Significant Figures is important while performing arithmetic so that the resulting answers accurately represent numbers that have computational significance or value.

There are three rules that are used to determine how many significant figures are in a number. There are also rules for determining how many digits should be included in numbers computed using addition/subtraction, multiplication/ division, or a combination of these operations.

A. Rules for determining how many Sig Figs are in a number:

- Rule #1: Non-Zero digits (# 1 – 9) and Zeros that are in between two non-zero digits are always significant.
- Rule #2: Leading zeroes are never significant.
- Rule #3: Trailing zeroes are only significant if a decimal point is present in the number.

Examples:

a. 809,231

Zero in between
DOES count

Ans: 6 SF's

b. 0.00456

Leading zeroes do
NOT count

Ans: 3 SF's

c. 2300

Trailing zeros do
NOT count

Ans: 2 SF's

d. 130.00

Trailing zeros
DO count bc
of the decimal

Ans: 5 SF's

B. Rules for performing Addition / Subtraction: The final answer is written so that it has the *same number of decimal places as the measurement that has the fewest decimal places (i.e. the number that is the least precise)*.

Examples:

a. $420.03 + 299.270 + 99.068 = 818.368 = \overset{\text{ANSWER}}{818.37}$

This number is the least precise (2 decimal places). So the answer MUST BE rounded to 2 decimal places.

b.
$$\begin{array}{r} 504.09 \\ 246.8 \\ - 119.32 \\ \hline 137.97 \end{array}$$

ANS: 138.0
(1 Decimal place)

- C. **Rules for performing Multiplication / Division:** The final answer is written so that it has the *same number of Sig Figs as the measurement with the fewest SF's*.

Examples:

a. $(2400)(3.45)(16.21) = 134,218.8 = 130,000$

(2 SF's) (3 SF's) (4 SF's) ANSWER

This number only has 2 Sig Figs, so the answer must be rounded to 2 SF's.

Only has 3 SF's, so answer needs rounded to 3 SF's.

b.
$$\begin{array}{r} 0.9935 \\ 10.48 \\ \times 13.4 \\ \hline 139.519192 \end{array}$$
 (Need to round)

ANS: 140.

OR 1.40×10^2

Decimal point causes the "0" to count as a SF.

- D. **Rules for Performing a Combination of Operations:** The previous rules listed for A/S and M/D still apply along with incorporating the rules for order of operations (i.e. PEMDAS). Be cautious, however, that you **do not round the answer too early!**

Example: $1.4 \times 2.639 + 117.25$ (Order of Operations → Multiply then Add)

This is **CORRECT!**

Step 1: Multiply -

$1.4 \times 2.639 + 117.25$
 $= 3.6946$

Because this is multiplication, the answer to this part can only have 2 SF's. This means that the first and second digits are significant. For this particular problem, this means the ones place and the first decimal place. Make note of this, but do **NOT** round yet.

This is **NOT** Correct!

$= 1.4 \times 2.639 + 117.25$
 $= 3.7 + 117.25 = 120.95 \neq 121.0$

Error - Rounded too early. Should have been left as 3.6946.

Step 2: Addition -

$= 3.6946 + 117.25 = 120.9446 = 120.9$ (Correct Answer)

1 decimal place 2 decimal places

Answer needs to be rounded to 1 decimal place because that is the least precise number in the addition calculation.

Note - Conversion Factors are considered to be "perfect" quantities and are not used to determine the number of sig figs / decimal places in the calculated answer.

Significant Figures Worksheet

1. Indicate how many significant figures there are in each of the following measured values.

246.32	_____	1.008	_____	700000	_____
107.854	_____	0.00340	_____	350.670	_____
100.3	_____	14.600	_____	1.0000	_____
0.678	_____	0.0001	_____	320001	_____

2. Calculate the answers to the appropriate number of significant figures.

Round to the least number of decimal places

$$\begin{array}{r} 32.567 \\ 135.0 \\ + 1.4567 \\ \hline \end{array}$$

$$\begin{array}{r} 246.24 \\ 238.278 \\ + 98.3 \\ \hline \end{array}$$

$$\begin{array}{r} 658.0 \\ 23.5478 \\ + 1345.29 \\ \hline \end{array}$$

3. Calculate the answers to the appropriate number of significant figures.

Hint: write it in scientific notation for e.

- | | | | |
|-------------------------|---------|-------------------------|---------|
| a) 23.7×3.8 | = _____ | e) 43.678×64.1 | = _____ |
| b) 45.76×0.25 | = _____ | f) $1.678 / 0.42$ | = _____ |
| c) 81.04×0.010 | = _____ | g) $28.367 / 3.74$ | = _____ |
| d) 6.47×64.5 | = _____ | h) $4278 / 1.006$ | = _____ |

Simple Algebra problems using density

The density of an object is determined using the formula

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

1. If the mass of an object is 1.80g and the volume is 1.35mL. What would the density be? The unit for your answer would be g/mL

2. How would you rearrange the equation to solve for Mass? (Write mass on the left side of the equation and use your algebra skills)

Mass = _____ (write the words)

If the volume of an object is 130mL and the density is 3.0 g/mL, what is the mass of the object?

3. How would you rearrange the equation to solve for Volume?

Volume = _____

If the mass of an object is 530g and the density is 2.0g/mL, what is the volume ?

More Algebra Practice: In chemistry you will need to solve for x in many equations. Here are some practice equations to see if you remember how to do it. Please show your steps since you can use your calculator. Round your answers to 2 decimal places. (This lets me know where you are algebra wise – it is ok if it is done incorrectly.)

1) $(12.5)(6.5) = (9.1)x$

2) $7.1 - x = 1.2 + x$

3) $7.5 - 3.6x = 16.1 + 2.5x$

4) $(4.7)(10.8) = (2.3)(8.1 - x)$ (don't forget to distribute the 2.3)

5) $(2.1)(x - 4.5) = -(4.7)(x - 3.6)$ (distribute again 😊)