

Chemistry 105
Experiment 0: Math and Calculator Review

Version: January 19, 2006

- Round decimal numbers
- Calculate fractions
- Solve algebraic expressions
- Convert units

Discussion

Mathematics is an essential part of any science. The ability to solve algebraic problems is of central importance for your success in chemistry. This laboratory exercise will exercise your ability to perform simple mathematical processes and basic algebraic functions.

Procedure

Perform the following mathematical operations and submit your results to your instructor.

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Name _____
Section _____ Locker _____
Instructor _____

1. Round each of the following to the underlined digit

| | | | | | |
|----------------|-------|-----------------|-------|------------------|-------|
| 1. <u>7</u> 85 | _____ | 2 <u>1</u> .498 | _____ | 15.9 <u>9</u> 94 | _____ |
| 15. <u>4</u> 5 | _____ | 15. <u>3</u> 5 | _____ | 27.0 <u>4</u> 48 | _____ |

 2. Express your answer to each of the following as the simplest whole-number fraction.

| | | | |
|--------------------|-------|------------------------------------|-------|
| $2/3 + 1/6 =$ | _____ | $1/3 - 1/2 =$ | _____ |
| $2/3 \times 1/6 =$ | _____ | $1/3 \times 1/2 =$ | _____ |
| $2/3 \div 1/6 =$ | _____ | $1/3 \div 1/2 =$ | _____ |
| $2/5 \div 4/9 =$ | _____ | $2\frac{1}{2} \div 3\frac{3}{4} =$ | _____ |

 3. Express your answer to each of the following as the simplest whole-number fraction.

| | | | |
|----------------|-------|----------------|-------|
| 1.6 <u>6</u> 7 | _____ | 5.3 <u>3</u> 3 | _____ |
| 2.2 <u>5</u> | _____ | 3.2 <u>0</u> | _____ |

 4. Solve each of the following:
 - a. A class is composed of 17 women and 22 men. What percent of the class is women? _____

 - b. If 27% of a class is women and there are 9 women, what is the number of students in the class? _____

 - c. A mixture of sand and salt weighing 5.6 pounds contains 4.2 pounds of sand. What is the percent salt in the mixture? _____

 - d. 75.0 % of what number is equal to 60.0 % of 25.0? _____

 5. Solve for Z in each of the following equations.
 - a. $5.00Z = 20.0 + 3.00Y$, where $Y = 15.0$ _____

 - b. $32.0/Z = 40.0/25.0$ _____

 - c. $22.0Z + 20.0(1.00 - Z) = 21.5$ _____

 - d. $1.75(82.0 - Z) = 4.22(Z - 24.0)$ _____

 6. Combine the following expressions as indicated.
 - a. Express F as a function of K if $F = 1.8C + 32$ and $K = C + 273$ _____

 - b. Find an expression for $\frac{m}{V}$ if $PV = nRT$ and $n = \frac{m}{M}$. _____
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7. Solve.
- a. If the square root of $\frac{Z}{22}$ is equal to 2.0, what is Z ? _____
 - b. Find the fifth root of 6.85×10^{35} . _____
8. Find the two roots of $x^2 + 0.36x - 1.36 = 0$, either by using the quadratic formula, by using your calculator's solver, by using your calculator's poly function, by graphing, or by trial and error. _____
9. Convert the following.
- a. 147 miles per hour to m/s. _____
 - b. 2.56×10^{-15} Gm to pm. _____
 - c. 156 teaspoons to mL. There are 3 teaspoons in a tablespoon, 4 tablespoons in 1/4 cup, 2 cups in a pint, 2 pints in a quart (don't you just love the American system?), and 1 L = 1.057 qt. _____
 - d. If there are 1.057 qt/L, how many L/qt? _____
10. Go to www.mathematicshelpcentral.com, click on the graph paper link, and download and print three copies of Form 4B-BW. Use that graph paper for #10 and #11. For each graph, locate the origin (0,0) at the lower left and plot only the first quadrant.
- a. In the equation for a straight line, $y = mx + b$, m is the slope and b is the intercept. For the equation $y = 4.25x + 1.35$, plot the points for $x = 2, 4, 6, 8,$ and 10 . Your axes should be x and y . Draw the line. Label and show the scale for each axis.
 - b. If the line from part a passed through the origin (in other words, if $b = 0$ in the equation), what kind of proportionality (direct or inverse) would exist between x and y ? Draw another line on your graph for this special case.
11. Given the equation $y = m(1/x) + b$:
- a. Plot the line for $y = 4.25(1/x) + 1.35$ on another sheet of graph paper for $x = 2, 4, 6, 8,$ and 10 . Your axes should be $1/x$ and y . Label and show the scale for each axis.
 - b. What kind of proportionality exists between $1/x$ and y when $b = 0$? _____
 - c. What kind of proportionality exists between x and y when $b = 0$?
Make a plot of y versus x on a third sheet of graph paper. _____
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