

Newberger College Algebra for the Sciences Spring 05

Homework: Functions and Words

Due: Tuesday, February 15

Write your answers to the following problems clearly and neatly, making sure to follow the instructions given here about how your answer should be presented. I may deduct credit for not following the instructions.

Copy the question onto your homework, or answer in a sentence. I should not have to refer to the homework sheet to understand your work.

1. (10 points)

- a. The density of copper is 8.93 g/cm^3 .
 - i. Find the algebraic formula for the function given verbally below. The function $f(x)$ yields the number of cubic centimeters in x grams of copper.
 - ii. For the function $f(x)$ given above, what is $f(200.)$? Use correct significant figures. What does $f(200.)$ represent verbally? Answer in a complete sentence.
 - iii. Write a verbal description for the function given algebraically below.

$$g(x) = 8.93x$$

- iv. Use the function f to answer this question: how many grams are there in 10.0 cm^3 of copper? Use correct significant figures in your answer.
- b. The mass of a single copper atom is 1.06×10^{-22} grams.
 - i. What ratio is given in this information? Copy the question onto your homework, or answer in a sentence.
 - ii. Find two meaningful functions using this information. Express each function both algebraically and verbally.
- c. The density of copper is 8.93 g/cm^3 , and the mass of a single copper atom is 1.06×10^{-22} grams. Explain each step you use to find the answer to the following question. Express the answer in a sentence and use correct significant figures. How many copper atoms are there in 2.0 cm^3 of copper?

2. (10 points)

- a. The density of aluminum foil is 269 cg/cm^3 . Find two meaningful functions using this information. Express each function both algebraically and verbally.
- b. A square piece of aluminum foil is 4.0 inches on a side.

- i. Draw a picture of the foil. Make it thick enough that you can label its thickness with the variable t . Label the sides 4.0 inches.
 - ii. Write the algebraic formula for the function $V(t)$ that yields the volume in cubic centimeters of the piece of foil, if it is t centimeters thick.
 - iii. Write the algebraic formula for the function $T(v)$ that yields the thickness of the piece of foil in inches, if it has a volume of v cubic inches. Hint: write the equation for volume and then solve for t . That will give the thickness, in terms of v which is volume. Call the function that you get $T(v)$, instead of just t .
 - iv. Write the algebraic formula for the function $V(t)$ that yields the volume in cubic centimeters of the piece of foil, if it is t inches thick.
 - v. Write the algebraic formula for the function $T(v)$ that yields the thickness in inches of the piece of foil, if the volume of the foil is v cubic centimeters.
- c. Now The density of aluminum foil is 269 cg/cm^3 , and we have A square piece of aluminum foil is 4.0 inches on a side. Explain the steps you use to solve the following problem: find the thickness of the foil in inches if its mass is 0.466 g.

3. (10 points)

- a. A sulfuric acid solution is 38.1% acid by mass. Think of this as a ratio

$$\frac{38.1 \text{ parts acid (by mass)}}{100 \text{ parts solution (by mass)}}$$

- i. Write the function $f(x)$ that yields the mass in grams of acid in x grams of solution. Think of the units on x as “grams of solution” rather than simply “grams.”
 - ii. Write the function $f(x)$ that yields the mass in kilograms of acid in x kilograms of solution.
 - iii. Write the function $g(x)$ that yields the mass in grams of solution needed to produce x grams of acid.
- b. The density of a solution of sulfuric acid is 1.29 g/cm^3 , and it is 38.1% acid by mass. Explain the steps you use to answer the following question: What is the mass of acid in 25.0 mL of solution. (Think of the units on 25.0 as being “mL of solution,” rather than just “mL.”)