Name ______________________ Date ________________ Class ________________

3.3 CONVERSION PROBLEMS

Section Review

Objectives

- Construct conversion factors from equivalent measurements
- Apply the techniques of dimensional analysis to a variety of conversion problems
- Solve problems by breaking the solution into steps
- Convert complex units, using dimensional analysis

Vocabulary

- conversion factor
- dimensional analysis

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

Whenever two measurements are equal, or equivalent, a ratio of these two measurements will equal __1__. A ratio of equivalent measurements is called a __2__. When a measurement is multiplied by a conversion factor, the value of the measurement __3__.

In __4__, the units that are a part of the measurements are used to help solve the problem. The form of the conversion factor that is used is the one in which the unit of the __5__ is in the denominator.

Many complex word problems can be solved by breaking the solution into __6__. When converting between units, it is often necessary to use more than one __7__.

In doing multistep problems, it is important to check that the numerator and __8__ of each conversion factor are equivalent. When the __9__ cancel, you should be left with the unit of the __10__.

1. one
2. conversion factor
3. remains the same
4. dimensional analysis
5. ~~[illegible]~~ Known
6. steps
7. conversion factor
8. denominator
9. units
10. unknown

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Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

NT 11. The units of a conversion factor must cancel.

ST 12. The conversion factor for changing between grams and milligrams is $\frac{1 \text{ g}}{1000 \text{ mg}}$.

AT 13. Multiple conversion factors can be used to solve complex conversion problems.

NT 14. If density = mass/volume, then mass = density/volume.

AT 15. When two measurements are equal, a ratio of these two measurements will equal unity.

Part C Questions and Problems

Answer the following in the space provided.

16. Make the following conversions using Tables 3.1 and 3.2. Write your answers in scientific notation.

a. 125 g to kilograms

$125 \text{ g} \cdot \frac{1 \text{ Kg}}{1000 \text{ g}} = 0.125 \text{ Kg}$

b. 0.12 L to mL

$0.12 \text{ L} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 1.2 \times 10^2 \text{ mL}$

17. If 1500 white blood cells are lined up side by side, they would form a row 1.0 inch long. What is the average diameter in micrometers of a single white blood cell? (1 inch = 2.54 cm)

$\frac{1.0 \text{ in}}{1500 \text{ cells}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \cdot \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{10^6 \mu\text{m}}{1 \text{ m}} = 17 \mu\text{m/cell}$

18. A radio wave travels 186,000 miles per second. How many kilometers will the wave travel in one microsecond? (1 mile = 1.61 km)

$\frac{186000 \text{ miles}}{1 \text{ s}} \cdot \frac{1 \text{ s}}{10^6 \mu\text{s}} \cdot \frac{1.61 \text{ Km}}{1 \text{ mile}} = \frac{2.99 \times 10^{-1} \text{ Km}}{1 \mu\text{s}}$