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| **HEAL-105 — Learning Activity Module** **Lesson 1** General overview, one-step conversions within a system and some arithmetic review.You may want to print out this module overview and read it before proceeding with the learning activities. Print the activity pages, complete your work on them, scan your work and submit electronically.Module Summary* This module should be completed within the first week of class.
* The approximate amount of time required to complete this module is **1 hour**.

Learning GoalsAfter completing this module, you will be able to:1. Use standard arithmetic rounding rules and convert between decimals, fractions and percent.
2. Do a one-step metric conversion using dimensional analysis.
3. Do a one-step conversion using dimensional analysis for units in the Metric, Apothecary and Household Systems

Vocabulary or Terms**Percent Solution:**An X% solution means X grams/ 100 ml. So, a 35% solution means 35 grams/100ml. Learning ActivitiesTo complete this module successfully, you must complete the following learning activities. There are two parts: Review and An Introduction to Dimensional Analysis.* Lesson 1: Read and complete all the assignment pages in this module.
* Complete All parts of Assignment #1 and submit online. Make sure to take the following steps while completing the assignments.
	+ Step 1: Read all the material in this assignment
	+ Step 2: Complete ungraded portion (practice problems) and check in the student packet for answers
	+ Step 3: Complete the graded portion
	+ Step 4: Print and Submit both the graded and ungraded portion online.
* For additional support see the announcements for links to Khan Academy and CK-12.org

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**Lesson 1: Part I: Review**

**1. Rounding**

In a later lesson we will learn special rounding rules for this course. It is important to understand the standard rounding rules first.

Using standard rounding rules, round 3.175 to the nearest whole number, nearest hundredth and nearest tenth.

 Using 3.175 as an example and rounding to the nearest tenth….*For simple rounding, we are deciding if 3.175 is closer to the lower value 3.1 or closer to the next higher value 3.2. Since 5 is half way between, we round down when the next digit is below 5 and round up when the next digit is 5 or higher. Sometimes in medicine it makes more sense to round down. Read pages 10-11 in the text. We will use standard rounding rules except for scored tablets.*

Answers:

 3.175 becomes 3.2 when rounded to the nearest tenths because 7 is higher than 5

 3.175 becomes 3 when rounded to the nearest whole number because 1 is less than 5

 3.175 becomes 3.18 when rounded to the nearest hundredth because 5 equals 5

 **2. Interchange Ratios, Fractions, Decimals and Percents:**

  Example: 20% = 20 per 100 = 20 : 100 = 20/100 = 0.2

 **3. Complex Fractions.**

**Example 1:**

$$\frac{\frac{\frac{12}{3}}{24}}{6}$$

This is the same as $\frac{12}{3}$ divided by$\frac{24}{6}$. When you are dividing fractions, you go through a process where you change the sign and flip the fraction. This means the sign become multiplication and the last fraction gets flipped. After this you multiply across. See below for an example.

$\frac{12}{3} x \frac{6}{24}= \frac{72}{72}$= 1 **The last step is to simplify.**

**Example 2:**

$$\frac{12}{3}x \frac{1}{\frac{4}{5}}$$

**The first step is to rewrite** $\frac{1}{\frac{4}{5}}$ **as** $\frac{1}{1} x \frac{5}{4}$**.. look above for an explanation of why. Once you have rewritten the fractions. Multiply across. Then, Simplify.**

$$\frac{12}{3}x\frac{1}{1}x \frac{5}{4}= \frac{60}{12}=5$$

 **4. Practice on how to use a calculator –**

You need to be able to -

        add and multiply fractions;

        convert from proper to improper and vice versa;

        convert from decimals to fractions and vice versa.

**** work with complex fractions and order of operations.

Calculators are only helpful if we know how to use them correctly. Not all calculators work exactly the same. For this course you will be allowed the same calculator as in the Nursing Program. Check with the Test Center on the calculator currently allowed. The examples below illustrate how critical parentheses are when dealing with more than one number or operation in the numerator and denominator of a fraction.

When doing a series of multiplication and divisions, there are several ways to enter the problems into the calculator.

Example: 

Method #1: 

Why does the 5 get divided?

Method #2: 3 × 7 ÷ (4 × 5)

 Why does the 5 get multiplied? This method only works with calculators that have parentheses.

Method #3: 

Compare this to the first method.

WARNING!!! You will not be using a scientific calculator in this course, but when you do use one it is important to use parentheses correctly: (3-7)÷(4+5) =

Be sure to review complex fraction techniques given in your text.

 **Part One Practice Problems (ungraded):**

    





**Solutions to Practice Problems: 1. 19 2.   3. 500**

**Lesson 1: Part 2: An Introduction to Dimensional Analysis**

Dimensional Analysis is a technique for converting from one unit to another with fewer formulas to memorize and with less algebraic manipulations. It is used in many science courses. You will need to memorize the basic conversions, but most students find they do this just by doing the homework. Below is an example of dimensional analysis using a conversion that is familiar to students who understand linear measurements.

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| --- | --- |
|  12 in = 1 ft  100cm = 1 m  | Because 12 in = 1 ft and 100cm = 1 m, we can set up two equivalent ratios for each of them.  |

One-Step Conversions

*Find this table on your conversion sheet in the student packet.*

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| --- | --- |
| 1 cc (cubic centimeter) = 1 mL (milliliter) 1000cc = 1000 mL = 1 L (liter)Note: cc’s are no longer used, but you should be aware of them. |   l kg (kilogram) = 1000 g (grams) 1 g = 1000 mg (milligram) 1 mg = 1000 mcg (microgram) 1 mg = 1000 ìg (microgram) |

Example: Convert 0.75 g to mg 

1. Start by writing a fraction. 0.75 g over 1. (If you are doing hand calculations you may want to use 75/100)
2. Multiply by the conversion fraction that relates g to mg.

 

1. Cancel out the units. Only mg should be left.
2. Complete the calculations.  (Answer: 750 mg)

Use the conversion table in your packet for Household and Apothecary units.

Example: Convert 2 Tablespoons to teaspoons.

1. Write 2 Tablespoons as a fraction over 1.
2. Multiply by the conversion that relates teaspoons and tablespoons.
3. Cancel out the units. Only t should be left.
4. Complete the calculations. (Answer: 6 t)



 **Part Two Practice Problems (ungraded):**

* You only need to memorize the conversions on the sheet in your information packet.
* Metric answers should be in decimal form, rounded to the nearest hundredth.
* Always write the units of measure in your answer, unless otherwise stated.
* Make sure to put a zero in front of the decimal if there is no whole number ( see practice problem #4)
* Non-metric answers should be in whole number or fractional form.
1. 14 lb = \_\_\_\_\_kg
2. 64 cups = \_\_\_\_\_ pt
3. 300 cm = \_\_\_\_ mm
4. 140 g= \_\_\_\_\_\_kg
5. 6 mcg = \_\_\_\_\_\_mg

**Solutions to Practice Problems:**

1. 6.36 kg
2. 32 pt
3. 3000 mm
4. 0.14 kg
5. 0.006 mg

Print and submit the assignment pages. Include detailed work.

**HEAL-105 DRUG CALCULATIONS (Graded Portion)**

Assignment #1 Student Name:

**Show your work including the operations used on the calculator.**

**Review of Arithmetic**

Proper use of a calculator is important. Be sure you can do the following problems correctly. EMT students should also practice these without a calculator.

1)  2) 100 x 0.017

3)  4) 

5)  6) 

**METRIC Conversions**

**Show the set-up for each problem. Solutions are in your student packet.**

1. 3 L = \_\_\_\_\_\_\_\_\_ mL 6. 1.75 mg = \_\_\_\_\_\_\_\_\_ g

2. 0.002 g = \_\_\_\_\_\_\_\_\_ mg 7. 500 mcg = \_\_\_\_\_\_\_\_\_ mg

Assign. #1 cont. Student Name:

3. 300 mg = \_\_\_\_\_\_\_\_\_g 8. 0.006 L = \_\_\_\_\_\_\_\_\_mL

4. 750 mcg = \_\_\_\_\_\_\_\_\_mg 9. 0.25 kg = \_\_\_\_\_\_\_\_\_g

5. 3.75 L = \_\_\_\_\_\_\_\_\_mL 10. 700 mcg = \_\_\_\_\_\_\_\_\_mg

11. The doctor's order reads 80 mg of Inderal. How many grams would you administer?

12. The order reads 0.5 g of chloramphenicol. What is the equivalent in mg?

**Non-metric problems**

Leave answers in whole number or fractional form.

 1 fluid ounce (1 fl.oz.) = 2 Tablespoons (2 T)

 13. 16 fl.oz = \_\_\_\_\_\_\_T 14. 6 T = \_\_\_\_\_\_\_\_\_\_fl. oz