

GUIDED PRACTICE FOR METRIC CONVERSIONS

Class: CHM 1210

Date assigned: August 25th

Date due: August 28th

Time estimate to complete this assignment: 30 minutes

Overview/Introduction

This goal of this exercise is to be able to convert between different metric prefixes. In the United States the English system is used for measurements. Everywhere else in the world the system of measurement used is the metric system. The advantage of the metric system is that every prefix is based on a factor of 10. These metric prefixes can be used to represent a certain “size” of the measurement. Depending on the measurement (For example: an extremely small number - like the width of an atom) an appropriate prefix needs to be used. This may require a conversion between prefixes to reflect the magnitude of the number.

Learning Objectives

Basic objectives

Each student will be responsible for learning and demonstrating proficiency in the following basic objectives before the class meeting.

- Understand the meaning of a base unit.
- Identify the different base units of measurements for mass, length, time, and volume.
- Identify the prefixes (table 1.1 in textbook) used to express large values.
- Identify the prefixes (table 1.1 in textbook) used to express small values.
- Give examples of large and small things in everyday life – identify the best prefix to use.

Advanced objectives

The advanced learning objectives should be mastered by each student while performing the in class exercises. These exercises will be followed up with 3 online homework questions to confirm to the student their mastery.

- Use these prefixes to convert between the different units of measurement. Example: converting a mass in grams to milligrams.
- Convert between 2 prefix-base numbers. Example: converting a length in centimeters to millimeters.

Preparatory Activities and Resources:

- Reading: Read sections 1.4 – 1.6, pages 54 -64 in *Chemistry 7th edition, by McMurry and Fay*. Make sure to practice the worked examples while going through the reading.
- Viewing: Watch the following YouTube videos on the metric system.
 - <https://www.youtube.com/watch?v=pEDVddQvimI> (about 7 minutes)

Exercises: Please complete by the August 28th lecture.

The assigned problems are available on your online ALEKS homework system under first assignment – metric conversions. The homework system will have you keep attempting the problems until you have learned them. This is a graded assignment so be sure to submit/finish before lecture. The assigned problems will only cover the basic objectives. When you complete these problems, you will be prepared to perform the advanced objectives in lecture.

Questions?

If you need help accessing the online videos or homework, you can contact me jhumphries@cpp.edu.

Lesson Plan for Using Metric Conversions

Lesson: Understanding and Application of Metric Conversions In Calculations

Timeframe:

Preclass activities

Watch video on metric conversions concept - 5 minutes

Read textbook sections on metric conversions - 15 minutes

Finish online homework - 5 - 15 minutes depending on aptitude

Postclass activities

Finish more advanced online homework from the expanded topics learned in class. - 10 - 15 minutes

Materials needed:

Worked out solutions to problems from online homework.

Printed copy of metric prefixes table that was posted on blackboard

Scientific calculator

Objectives:

Basic:

1. Understand the meaning of a base unit.
2. Identify the different base units of measurements for mass, length, time, and volume.
3. Identify the prefixes (table 1.1 in textbook) used to express large values.
4. Identify the prefixes (table 1.1 in textbook) used to express small values.
5. Give examples of large and small things in everyday life – identify the best prefix to use.

Advanced:

1. Use these prefixes to convert between the different units of measurement. Example: converting a mass in grams to milligrams.
2. Convert between 2 prefix-base numbers. Example: converting a length in centimeters to millimeters.

Background to the Lesson:

Even though all basic and advanced topics are assumed to be review as a prerequisite for CHM 121, there will be students that are not familiar with the metric system up through students that completely understand the most advanced topics of the calculations. The schedule of topics, set by the Chemistry

department, consist of a review of metric conversions and related calculations during the first week of the course. This lesson will occur during the first week. The prerequisite for the course is high school chemistry. Students may be unprepared for reasons such as, a long timeframe from the previous course or lack of knowledge presented from the previous course.

Introduction to Lesson:

All measurements in scientific disciplines exclusively use the metric system. The English system of measurement is obsolete. The purpose of this lesson will be to re-familiarize learners with the purpose of the metric system of prefixes and how to apply these to calculations using these prefixes. The pre-class assignments will use videos and readings from the text to assist students to solve the basic online homework problems before the lecture.

Procedure

Pre-Class Individual Space Activities and Resources: Outline the major steps for the preparatory activities and be sure to tie the steps to the basic learning objectives you have noted above. Note resources required for learner preparation.

Steps	Purpose	Estimated Time	Learning Objective
Step 1: Read sections of textbook related to metric system.	To make it easy for students to find the required reading for each topic throughout the quarter* and to see in text form the metric systems topics	5 minutes	Understand the purpose of the prefixes of the metric system
Step 2: Watch video presenting the basics of the metric system, why it was established over the English system, and how the prefixes show an order of magnitude for a measured value.	To help students see why this topic is so important and that all areas of science and engineering depend on this system for measurements.	5 minutes	Understand the global purpose of the metric system.
Step 3: Short assignment on the online homework system with appropriate due date for finishing as pre-class activity	To have students test their level of actual understanding. Sometimes they assume that it is easier than they thought, and the homework puts that into perspective.	5-15 minutes depending on aptitude.	Understand how the metric system relates to orders of magnitude for measurements

* students are reluctant to use their textbooks and would benefit from understanding early during the course how to use the textbook.

In-Class Group Space Activities and Resources. Outline the major steps for the in-class activities and be sure to tie the steps to the advanced learning objectives you have noted above. Also note any resources needed/developed to provide effective active learning activities within class.

Steps	Purpose	Estimated Time	Learning Objective
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<p>Step 1: Explain the purpose of the pre-class activity.</p>	<p>Help students see the value, since they may be resentful</p>	<p>5 minutes</p>	<p>To understand the value of pre-class activity</p>
<p>Step 2: Summarize content from reading and video and have them answer questions of what prefix to use for the radius of an atom or the mass of a car.</p>	<p>Students understanding of usefulness of metric prefixes with base units.</p>	<p>10 minutes</p>	<p>Identify metric prefixes orders of magnitude for large and small measurements</p>
<p>Step 3: Have students pair up. Bring up the assignment from the pre-class online homework and answer as pairs.</p>	<p>Reinforce the "think pair share" activity use. Familiarize students with online features they may have not realized were there.</p>	<p>5 minutes</p>	<p>Identify metric prefixes orders of magnitude for large and small measurements</p>
<p>Step 4: Provide an example problem worked out for students on the board.</p>	<p>Show students how to use the prefixes in basic calculations.</p>	<p>5 minutes</p>	<p>Use these prefixes to convert between the different units of measurement</p>
<p>Step 5: Have students pair up and work out problem like the example I showed.</p>	<p>Students check their understanding and ability to apply the example problem to this problem.</p>	<p>5 minutes</p>	<p>Use these prefixes to convert between the different units of measurement</p>

Step 6: Provide an example 2 step problem worked out for students on the board.	Show students how to use the prefixes in 2 step calculations.	5 minutes	Convert between 2 prefix-base numbers
Step 7: Have students pair up and work out problem like the example I showed.	Students check their understanding and ability to apply the example problem to this problem.	5 minutes	Convert between 2 prefix-base numbers

The total time adds up to 40 minutes for a 50 minute class to allow for additional questions from students.

Post-Class Individual Space Activities and Resources. Outline the major steps for the post-class activities and be sure to tie the steps to the advanced learning objectives you have noted above. Also note any resources learners will need to complete any post-class activities assigned after the group space activities.

Steps	Purpose	Estimated Time	Learning Objective
Step 1: Short assignment on the online homework system.	To verify to the learner, their understanding and feel confident to move forward to more advanced topics in week 2 of the course.	5-15 minutes	To test their level of understanding of metric conversion calculations

Evaluation:

Analysis.

I'm a little worried about keeping to the timeline. The times I put are completely reasonable, but I tend to stray and spend too much time re-explaining and could refer them to office hours for additional help.

I always have success early in the semester with the "think pair share". They like the concept but lose their enthusiasm later during the semester.

I'm confident that assigning them to read the textbook will create more interest in using the text throughout the quarter. I'm also hoping that the early online homework exposure keeps them motivated to not get as frustrated with the techniques of that system.

I think that this will help students understand the value of preparing before class, even when no pre-class assignment is required.

Connections to Future Lessons. More than half of the topics covered in CHM 1210 require conversions during the calculations. The process used during this lesson will apply to all the calculations during the semester.