Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Chemistry I	Unit 5 Title:	Scientific Measurement	Grade Level(s):	10th
Assessed Trimester:	Trimester A	Pacing:	3 - 5 Days	Date Created:	6/7/2012	Last Revision Date:	6/23/2014

Course Understandings: *Students will understand that:*

- Problems can be solved and knowledge gained in a systematic way: solutions to one problem can create new questions and problems.
- Chemistry is recognized as significant in its application to other disciplines and the world.
- Ideas are expressed symbolically, numerically, and graphically.
- Behavior and properties of materials are organized, classified, and predicted utilizing periodic trends.
- Mathematical relationships are interpreted and manipulated to model the real world.
- The basic building blocks combine and recombine in a variety of ways to make all matter from the simple to the complex.
- The laws of chemistry predict outcomes that impact and apply to daily life.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

- **Standard:**
  - **9C.1.3.4.1:** Use significant figures and an understanding of accuracy and precision in scientific measurements to determine and express the uncertainty of a result.
  - **9C.1.3.4.1:** Use significant figures and an understanding of accuracy and precision in scientific measurements to determine and express the uncertainty of a result.

- **Literacy Standards:**
  - **9.13.6.6:** Analyze the author's purpose in describing phenomena, providing an explanation, describing a procedure, or discussing/reporting an experiment in a text, defining the question the author seeks to address.
  - **9.13.9.9:** Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. (discuss models)
  - **9.14.4.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to discipline, task, purpose, and audience.
  - **9.14.5.5:** Use a writing process to develop and strengthen writing as needed by planning, drafting, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience, and appropriate to the discipline.
  - **9.14.6.6:** Use technology, including**,** but not limited to, the Internet, to produce, publish, and update individual or shared writing products and multi-media texts, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
  - **9.14.10.10:** Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes and audiences.

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

- Use the concepts to determine if a number is appropriately reported.
- Explain how the concepts of accuracy and precision influence the answers to quantitative scientific questions.
- Why certain units are used to report and measure certain values.

Meaning

Unit Understanding(s):	Essential Question(s):
Students will understand that: • Measurements are not perfect and are subject to the accuracy and precision of the device(s) used. • Calculations with measured values must be rounded to an appropriate and truthful value.	**Students will keep considering:** • Why are careful measurements and calculations essential to success in scientific fields? • Why can't I just write down the answer to two decimal places?

Acquisition

Knowledge - Students will:
- Know rules for determining significant figures in measurements and calculations. 9C.1.3.4.1 (L)

Reasoning - Students will:
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Skills - Students will:
- Students will use scientific notation. 9C.1.3.4.1 (L)
- Express a measurement in terms of the uncertainty of the measurement. 9C.1.3.4.1 (L)

Common Misunderstandings
- Measurement is only linear.
- Any quantity can be measured as accurately as you want.
- Children who have used measuring devices at home already know how to measure.
- The metric system is more accurate than other measurement systems (such as the English system).
- The English system is easier to use than the metric system.
- You can only measure to the smallest unit shown on the measuring device.
- Some objects cannot be measured because of their size or inaccessibility.
- The five senses are infallible.
- An object must be “touched” to be measured.
- A measuring device must be a physical object.
- Mass and weight are the same and they are equal at all times.
- Mass and volume are the same.
- There is only one way to measure perimeter.
- Only the area of rectangular shapes can be measured in square units.
- You cannot measure the volume of some objects because they do not have “regular” lengths, widths, or heights.
- An object’s volume is greater in water than in air.
- The density of an object depends only on its volume.
- Density for a given volume is always the same.

Essential new vocabulary
- Significant figures
- Uncertainty
- Accuracy
- Precision