Krug Chemistry – Deep Run Daily Planning Guide

Date of Lesson: Q1 Day 4 – Recording Measurements, Numbers in Science Lab

Topic /Big Questions: (Question Stems & Question Creation Chart)

- **How do chemists record measurements?**
- **What are significant figures and why are they important?**
- **When is it necessary to use scientific notation?**
- **How do accuracy, precision, and uncertainty affect measurements?**

State SOL	Unpacking the Standards (Video explanation shown at 3:18)
CH 1 a - j	a) designated laboratory techniques; b) safe use of chemicals and equipment; c) proper response to emergency situations; d) manipulation of multiple variables, using repeated trials; e) accurate recording, organization, and analysis of data through repeated trials; f) mathematical and procedural error analysis; g) mathematical manipulations including SI units, scientific notation, linear equations, graphing, ratio and proportion, significant digits, and dimensional analysis; h) use of appropriate technology including computers, graphing calculators, and probeware, for gathering data, communicating results, and using simulations to model concepts; i) construction and defense of a scientific viewpoint; and j) the use of current applications to reinforce chemistry concepts.

Visible Learning (For the three items with asterisks*, think from a student perspective. Use simple language)

***What am I learning today?** Marks drawn on laboratory equipment are used to record measurements. The accuracy depends on the marks you can see. Uncertainty occurs when you must record a measurement that falls between the marks. Precision occurs when repeated trials yield similar results. Significant Figures represent the level of accuracy and precision in a measurement. Scientific notation is useful when numbers are very large or very small.

***Why is it important?** Understanding proper techniques for recording measurement is essential for reporting results and communicating with other chemists.

***How will I know I've learned it?** Students will take notes on media presentation and practice taking and recording measurements during the Numbers in Science Lab. Students will edit their labs to correct any mistakes during the class review at the end of the activity.

Differentiation strategies:

Media Presentation – SI Units, Uncertainity, Recording Measurements

Numbers in Science Lab – understanding uncertainty in numbers

Accommodations and/or modifications are being met for students with IEP's/504's.

Access to all materials on Schoology; frequent checks for understanding; working in small groups

Daily Plan/Sequence of Instruction:

Teacher will explain rules for using significant figures when recording measurements and demonstrate how to measure the meniscus in a graduated cylinder.

Students will work together with a partner to complete the Numbers in Science Lab. Teacher will offer assistance as needed. Once all student groups are finished with the lab, teacher will guide the students back through the lab to correct any mistakes that were made and discuss uncertainty in measurements.

Assessments (List all formative/summative assessments used to check for understanding during this lesson. Summative assessments may occur during a different class period.):

Numbers in Science Lab – formative assessment (participation grade recorded in Powerschool)

After assessing today's lesson are you and your students comfortable moving forward with your next objective?

Yes - Students should gain confidence in taking measurements; some anxiety is expected but necessary so that they take recording measurements seriously; any remediation can be done during future labs

No, remediation required to proceed

Teacher reflection: Students struggle with the concept of how many decimals to include with each measurement. Even though I told them the correct amount of sig figs, and I wrote it on the board, almost every student had the wrong amount on their paper. Next time, I will suggest that the students write the legend on their worksheets. For example, we used 4 beam balances so the decimals went like this: 3 decimals for mass, 2 decimals for centimeters length, 1 decimal for graduated cylinder, and no decimals for the beaker. Students also struggled with the critical thinking questions on the back. It helps to explain how proportions work. For instance, when the top number is larger the value is greater, but when the bottom number is larger the value gets smaller. Using 1/100 and 100/1 compared to 1/1 makes it more obvious and easier to comprehend the change.