

Unit 1: Safety, Lab Procedures and Data Analysis

Content Area: **Science**
Course(s): **Chemistry/Lab Honors**
Time Period: **1st Marking Period**
Length: **6 Weeks**
Status: **Published**

Unit Overview

This unit is designed to allow students to demonstrate proper laboratory techniques including safety procedures, informed decision making, measurement techniques and sources of error.

Transfer

Students will be able to independently use their learning to make and take measurements and make decisions with safety in mind.

Meaning

Understandings

- 1) Following safety procedures, using personal protective equipment, and selecting the appropriate equipment or tools will reduce the risk of injury.
- 2) Planning, organizing, and analyzing data are essential components of solving problems.

Essential Questions

- 1) What does “Safety first!” demand from us?
- 2) How do we organize and analyze data?
- 3) Can we solve problems without the scientific method?

Application of Knowledge and Skill

Students will know...

- 1) How to identify glassware used in a laboratory setting.
- 2) How to use units and convert within the Metric System while making measurements.

Students will be skilled at...

- 1) Selecting and use the appropriate equipment or tool following all appropriate safety procedures.
- 2) Responding appropriately in an emergency situation.
- 3) Using the scientific method;
- 4) Organizing the data collected;
- 5) Analyzing the data noting where and why errors may have been made.

Vocabulary

Academic Vocabulary	Application Vocabulary
accuracy	balance
density	beaker
dependent variable	dropper bottle
derived unit	Erlenmeyer flask
fundamental unit	evaporating dish
hypothesis	graduated cylinder
independent variable	Material Safety Data Sheet
mass	scoopula
precision	spatula
scientific notation	stirring rod
significant figure	tare/zero
volume	watch glass

Learning Goal 1

Students will be able to use their learning of safety and lab procedures to make informed decisions when selecting and using equipment or tools.

NJSLS-Science: Science and Engineering Practices:

- 3: Planning and carrying out investigations.
- 4: Analyzing and interpreting data.
- 6: Constructing Explanations and designing solutions.
- 8: Obtaining, Evaluating and communicating information.

Proficiency Scale

- NJSLS-Science: Science and Engineering Practices: 3: Planning and carrying out investigations. 4: Analyzing and interpreting data. 6: Constructing Explanations and designing solutions. 8: Obtaining, Evaluating and communicating information.
- Students will be able to use their learning of safety and lab procedures to make informed decisions when selecting and using equipment or tools.

Target 1

SWBAT analyze and draw conclusions from an MSDS Sheet.

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Target 2

SWBAT to assess which equipment or tools are appropriate for using following all appropriate safety procedures.

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Target 3

SWBAT apply concepts when showing how to make accurate measurements using the balance, ruler, thermometer, and graduated cylinder.

- SWBAT apply concepts when showing how to make accurate measurements using the balance, ruler, thermometer, and graduated cylinder.

Learning Goal 2

Students will be able to transfer their learning of the scientific method and data analysis to solve problems and identify sources of error.

NJSLS-Science: Science and Engineering Practices:

1. Asking questions (for science) and defining problems (for engineering)
3. Planning and carrying out investigations
4. Analyzing and interpreting data
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Proficiency Scale

- NJSLS-Science: Science and Engineering Practices:: 1. Asking questions (for science) and defining problems (for engineering) 3. Planning and carrying out investigations 4. Analyzing and interpreting data 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information
- Students will be able to transfer their learning of the scientific method and data analysis to solve problems and identify sources of error.

Target 1

SWBAT can apply the scientific method given a specific problem.

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Target 2

SWBAT draw conclusions from the data collected, given a specific problem.

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Target 3

SWBAT analyze the data noting where and why errors may have been made, given a specific problem.

- SWBAT analyze the data noting where and why errors may have been made, given a specific problem.

Learning Goal 3

SWBAT logically gather, order, and interpret data through appropriate use of measurements and tools.

NJSLS-Science: Science and Engineering Practices:

4. Analyzing and interpreting data
5. Using mathematics and computational thinking

Proficiency Scale

- NJSLS-Science: Science and Engineering Practices: 4. Analyzing and interpreting data 5. Using mathematics and computational thinking
- SWBAT logically gather, order, and interpret data through appropriate use of measurements and tools.

Target 1

SWBAT investigate SI units and other common units of measurement and be able to convert between these units of measurement.

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Target 2

SWBAT differentiate between accuracy and precision as they pertain to measurement data.

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Target 3

SWBAT analyze the number of significant figures in a measurement and perform mathematical operations using significant figures.

- SWBAT analyze the number of significant figures in a measurement and perform mathematical operations using significant figures.

Target 4

SWBAT connect scientific notation to standard notation to express numerical quantities.

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Target 5

SWBAT perform density calculations and develop a logical argument to determine whether an object will sink or float.

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Formative Assessment and Performance Opportunities

Lab Reports

Worksheets

PowerPoints with Notes

Homework and Classwork Activities

Group Activities

In Class Discussion

- Homework and Classwork Activities Group Activities
- In Class Discussion
- Lab Reports
- PowerPoints with Notes
- Worksheets

Summative Assessment

Unit Assessment will be created collaboratively and used for every student in the course. In addition, there will be other assessments in the form of lab reports, pen and paper tests, and quizzes. Common Assessment is administered through LinkIt.

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Accommodations/Modifications

All instruction, labs, activities, and assessments will be modified and enhanced to adhere to individual student's IEPs and 504s. As well differentiated classroom management strategies will be utilized as to adhere to these students individual plans as well. These strategies can be but are not limited to the following: Graphic Organizers and Flow Charts to help visualization of content, Using acronyms and mnemonic devices to assist memorization, Academic Games to practice skills and deepen understanding of topics, Stations and Learning Centers to influence peer tutoring, Utilizing Reviews and Study Guides to reteach complex content before summative and formative assessment, Providing additional resources to students during and outside of school (videos, study guides, teacher notes, web-based resources).

On Assessments, College Prep Chemistry students will be given the following resources: List of Metric prefixes and the formula for density.

On Assessments, Honors Chemistry students will not be given any resources.

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Unit Resources

Teacher generated Power Points, Notes, Labs and Worksheets

Textbooks

Resource Books

Internet Resources

Computer Based Activities

Calculators

Labs for this unit : MSDS / SDS Lab, Measurement Lab, Graphing Candy Corn Lab, & Laboratory Equipment and Functions

- Computer Based Activities
- Labs and Worksheets
- Notes
- Resource Books
- Teacher generated PowerPoints

- Textbooks

21st Century Life and Careers

CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP9.1	Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others'

action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.

CRP.K-12.CRP11.1

Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP.K-12.CRP12.1

Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Interdisciplinary Connections

MA.A-SSE.A.1b

Interpret complicated expressions by viewing one or more of their parts as a single entity.

MA.A-SSE.A.2

Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

MA.N-Q.A.1

Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

MA.K-12.6

Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

MA.N-Q.A.3

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

LA.RST.11-12.1

Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

LA.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

LA.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

LA.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

LA.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-

12 texts and topics.

LA.RST.9-10.5	Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LA.RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LA.RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LA.RST.11-12.10	By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
LA.WHST.9-10.6	Use technology, including the Internet, to produce, share, and update writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LA.WHST.11-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LA.WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LA.WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
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