Unit 1: Scientific Process and Measurement

Content Area: **Science**
Course(s): **Fundamental of Science**
Time Period: **1st Marking Period**
Length: **8 Weeks**
Status: **Published**

Unit Overview

This unit is designed to have the students explore the scientific process, properly use measuring equipment, and properly record and present their scientific data.

Transfer

Students will be able to walk through scientific and everyday problems using the scientific process they learned. Students will be able to use multiple measuring devices to measure mass, volume, and length in a lab setting and present their data in accordance to the SI System used world wide.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

1) Students will understand how to use the scientific method to solve problems.

2) Students will understand how to use multiple devices to measure mass, length, and volume. Students will then be able to convert these measurements to the proper SI Unit.

3) Students will be able to present data using the proper amount of significant figures and/or in scientific

notation.

4) Students should be able to relate the size of different measurements along with identifying which metric prefix to use while measuring.

Essential Questions

1) How can you use the scientific method everyday?

2) I want to set up an experiment to prove my friends wrong about something...how the heck do I do it!

3) How can different units affect the way a value is presented without affecting the value at all?

4) How do I use the "secret code" to show how precise my measurements really are?

Application of Knowledge and Skill

1) Students will be able to properly use the measuring devices covered in their own life.

2) Students will be able to present and analyze sceintific data correctly.

Students will know...

1) Students will know the different branches of science.

2) Students will know the difference between a scientific theory and scientific law

3) Students will know the steps of the scientific method.

4) Students will be able to describe the parts of an experiment.

5) Students will know what the SI System is and what the prefixes stand for.

Students will be skilled at...

1) Students will be able to use the scientific method to solve problems.

2) Students will be able to set up and run their own controlled experiment to gather data.

3) Students will be able to present their information on line graph.

4) Students will be able to measure the length, volume, and mass of objects.

5) Students will be able to present their data using the proper amount significant figures and scientific notation.

Academic Vocabulary

Academic Vocabulary	Application Vocabulary
Science	Slope
Qualitative	Model
Quantitative	Graph
Independent Variable	Observe
Dependent Variable	Experiment
Control	Conclusion
Constant	Convert
Variable	Digit
Axis	Value
Hypothesis	Compare
Significant Figure	Contrast
Precision	Analyze
Accuracy	Unit
SI System	
Mass	
Valume	

Learning Goal 1

SWBAT master major scientific concepts such as, graphing, experimenting, and presenting data.
Proficiency Scales

Next Gen Science 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 and designing solutions.

8: Obtaining, Evaluating and communicating information.

- Next Gen Science 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 and designing solutions. 8: Obtaining, Evaluating and communicating information.
- SWBAT master major scientific concepts such as, graphing, experimenting, and presenting data.

Data are gathered, displayed, summarized, examined, and interpreted to discover patterns and deviations from patterns. Quantitative data can be described in terms of key characteristics: measures of shape, center, and spread. The shape of a data distribution might be described as symmetric, skewed, flat, or bell shaped, and it might be summarized by a statistic measuring center (such as mean or median) and a statistic measuring spread (such as standard deviation or interquartile range). Different distributions can be compared numerically using these statistics or compared visually using plots. Knowledge of center and spread are not enough to describe a distribution. Which statistics to compare, which plots to use, and what the results of a comparison might mean, depend on the question to be investigated and the real-life actions to be taken.

Target 1

SWBAT List the steps of the scientific method and apply them to an everyday problem

- SWBAT List the steps of the scientific method and apply them to solve and everyday problem.

Target 2

SWBAT to compare and contrast a scientific theory and a scientific law, while distinguishing between the two of them.

- SWBAT Define the parts of a controlled experiment along with setting up their own controlled experiment.

Target 3

SWBAT Describe the three main types of graphs along with construct their own line graph.

- SWBAT Describe the three main types of graphs and contrust their own line graph based on scientific data.

Learning Goal 2

SWBAT use the SI system of measurement to properly measure and report scientific results using the correct techniques.

Proficiency Scale

Next Gen Science Practices:

4: Analyzing and interpreting data.

5: Using mathematics and computational thinking.

8: Obtaining, Evaluating and communicating information.

- SWBAT use the SI system of measurement to properly measure and report scientific results using the correct techniques.

MA.N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
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.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Target 1

SWBAT Describe how and why the SI System is used world wide, along with converting values within the SI System

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Target 2

SWBAT Explain the difference between Precision and Accuracy and use this information to accurately present numbers with the proper amount of significant figures.

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Target 3

SWBAT Put numbers in and take numbers out of scientific notation.

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Formative Assessment and Performance Opportunities

Lab Reports

Worksheets

PowerPoints with Notes

Homework and Classwork Activities

Group Activities

In Class Discussion

Do Nows and Closures

Class Polling

Observation

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

For target 3, Students will be divided into groups depending on their graphing ability. The low group will concentrate on

establishing a correct scale for graph.

All instruction, labs, activities, and assessments will be modified and enhanced to adhere to individual student's IEPs and 504s. Differentiated classroom management strategies will also be utilized so as to adhere to these students' individual plans.

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Unit Resources

Teacher generated Power Points, Notes, Labs and Worksheets

Textbooks

Resource Books

Internet Resources

Computer Based Activities

Projector

Smart Board

Calculators

21st Century Life and Careers

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
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.CRP10.1	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.