Unit 1: Safety, Metric Measurement, & Scientific Method

UNIT OVERVIEW
- Student is able to conduct safe lab and field investigations and uses appropriate tools. Student is able to measure mass, volume and length in metric units. Student is able to correctly create data tables, collect data and display results in the appropriate graph.

ENDURING UNDERSTANDINGS
- Safety, measurements, and scientific reasoning are critical to success in science.

CONCEPTS
- Utilize safe practices in lab settings.
- Metric system is used in science.
- Use the scientific method to plan and implement an experiment

ESSENTIAL QUESTIONS
- Why is lab safety important?
- Why must some wastes be disposed of differently than others?
- Why is the metric system used in science?
- Why is the metric system more user friendly than customary?
- Why do we represent data in the form of a graph?
- What are the steps to create a graph?
- How do we determine which graph is appropriate to represent your data?

<table>
<thead>
<tr>
<th>UNIT 1</th>
<th>PERFORMANCE LEVELS</th>
<th>LEARNING PROGRESSION (Student will…)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEARNING TARGET 1</td>
<td>PREREQUISITE KNOWLEDGE AND SKILLS</td>
<td>A. Review the Lab Safety Contract.</td>
</tr>
<tr>
<td></td>
<td>The student recognizes Texas Safety Standards and procedures and can locate equipment throughout the laboratory.</td>
<td>B. Recognize specific functions of specific equipment and locate equipment around classroom.</td>
</tr>
<tr>
<td></td>
<td>LEARNING TARGET</td>
<td>C. Define the meanings of lab safety symbols.</td>
</tr>
<tr>
<td></td>
<td>The student can demonstrate safe practices during laboratory investigations and appropriate use of tools to collect, record, and analyze data.</td>
<td>D. Design a visual representation showing the negative outcome of the misuse of safety equipment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. Lab Safety Quiz*</td>
</tr>
</tbody>
</table>
LEARNING TARGET 2

PREREQUISITE KNOWLEDGE AND SKILLS
The student collects data and records using the International System of Units (SI).

LEARNING TARGET
The student analyzes and interprets the data to construct graphs and formulate reasonable explanations.

A. Understand the conversion of units
B. Know the metric prefix sequence
C. Choose the correct unit of measurement for length, mass, and volume
D. Construct different types of graphs based on recorded data.
E. Interpret data and draw conclusions.

LEARNING TARGET 3

PREREQUISITE KNOWLEDGE AND SKILLS
The student describes the steps of the Scientific Method and identifies variables.

LEARNING TARGET
The student implements and evaluates the variables within a laboratory investigation and synthesizes the information into a scientific conclusion.

A. Practice making inferences and observations.
B. Distinguish the steps of the scientific method within a laboratory setting.
C. Classify variables in a given scientific investigation.
D. Design inquiry-based investigation using the appropriate steps and variables.
E. Relate the findings by examining all sides of scientific evidence.

Decision Point: is there a need for re-teach? Or, can we move forward?

FORMATIVE ASSESSMENTS
- Lab Safety & Metric Practice Quiz
- Safety Quiz
- Scientific Method Practice Quiz
- Lab Safety Gone Bad Project
- Lab Safety Skits (TAG)

SUMMATIVE ASSESSMENTS
- Lab Safety & Metrics Test
- Scientific Method Experimental Design Project
- Scientific Method Test

TEKS
7.1 Scientific investigation and reasoning. The student, for at least 40% of the instructional time, conducts laboratory and field investigations following safety procedures and environmentally appropriate and ethical practices. The student is expected to:

(A) demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards; and

(B) practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.

7.2 Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and field investigations. The student is expected to:

(A) plan and implement comparative and descriptive investigations by making observations,
asking well-defined questions, and using appropriate equipment and technology;

(B) design and implement experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology;

(C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers;

(D) construct tables and graphs, using repeated trials and means, to organize data and identify patterns; and

(E) analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.

7.3 Science investigation and reasoning. The student knows how to use a variety of tools and safety equipment to conduct science inquiry. The student is expected to:

(A) use appropriate tools to collect, record, and analyze information, including life science models, hand lens, stereoscopes, microscopes, beakers, Petri dishes, microscope slides, graduated cylinders, test tubes, meter sticks, metric rulers, metric tape measures, timing devices, hot plates, balances, thermometers, calculators, water test kits, computers, temperature and pH probes, collecting nets, insect traps, globes, digital cameras, journals/notebooks, and other equipment as needed to teach the curriculum; and

(B) use preventative safety equipment, including chemical splash goggles, aprons, and gloves, and be prepared to use emergency safety equipment, including an eye/face wash, a fire blanket, and a fire extinguisher.

7.4 Science investigation and reasoning. The student knows how to use a variety of tools and safety equipment to conduct science inquiry. The student is expected to:

(A) use appropriate tools to collect, record, and analyze information, including life science models, hand lens, stereoscopes, microscopes, beakers, Petri dishes, microscope slides, graduated cylinders, test tubes, meter sticks, metric rulers, metric tape measures, timing devices, hot plates, balances, thermometers, calculators, water test kits, computers, temperature and pH probes, collecting nets, insect traps, globes, digital cameras, journals/notebooks, and other equipment as needed to teach the curriculum; and

(B) use preventative safety equipment, including chemical splash goggles, aprons, and gloves, and be prepared to use emergency safety equipment, including an eye/face wash, a fire blanket, and a fire extinguisher.

PROCESSES AND SKILLS
- Lab Safety Contract & Rules
- Lab Safety Gone Bad! Posters
- Safety Matching Game
- Metric and Measurement Notes (2)
- Measurement Lab: Mass & Length
- Measurement Lab: Volume
- Metric Mania Lab
- Scientific Method Memory Game
- Scientific Method Notes
- Lesson of the Kaibab Reading and WS (data table and graphing)
- Paper Towel Lab
- Pretzel Lab (Conclusion Editing)
- Helicopter Lab (TAG)- Experimental Design

LANGUAGE OF INSTRUCTION
Hazardous, eye wash, fire blanket, vent hood, flammable, meter, liter, gram, metric system, graduated cylinder, meniscus, accurate, conversion, pie, line, bar, histogram, data table, x & y axis, increase, decrease, trend line,
mass, volume, length, scientific method, problem, hypotheses, procedures, results, conclusion, analysis, graph, independent variable, dependent variable.

RESOURCES
Discovery Education (online textbook)