Unit 02: Scientific Techniques/Lab Safety Week 1-week 9

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **Week 1-9**
Status: **Published**

Standards Alignment

Unit 1: Structure and Properties of Matter

- **MS-PS1-1:** Identify the tools that are appropriate for the study of science
- **MS-PS1-2:** Demonstrate the appropriate use of the tools of a scientist in order to correctly calculate mass, volume and density.

New Jersey Student Learning Standards

Performance Expectations:

- **Performance Expectations:**
  - **MS-PS1-1:** Develop and use a model to describe the atomic composition of simple molecules and extended structures using simple formulas of calculation
  - **MS-PS1-2:** Analyze and interpret data on the properties of substances such as mass, volume and density before and after the substances interact to determine if a chemical reaction has occurred.

LA.K-12.NJSLSA.R2	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
LA.RST.6-8	Reading Science and Technical Subjects
LA.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
SCI.MS-ETS1	Engineering Design
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new

	solution to better meet the criteria for success.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.2.8	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.8.2.8.A	The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live.
TECH.8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e., telephone for communication - smart phone for mobility needs).
TECH.8.2.8.B	Technology and Society: Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.
TECH.8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math

Section

	Key Ideas and Details
LA.K-12.NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
LA.RI.6	Reading Informational Text
LA.RI.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.K-12.NJSLSA.W	Writing
	Text Types and Purposes
LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.W.6.1.B	Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit…

All students will understand that science is both is body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge.

Meaning

Essential Questions

Essential Questions

1. What is the purpose of science?
2. How do scientists contribute to society?
3. What is the difference in a claim and evidence?
4. What are the safety procedures that protect me and my classmates?
5. How do you measure length, mass, volume and density of an object??.

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

1. Science is a body of knowledge that is constantly changing..
2. Scientific investigations follow a general pattern of observing, hypothesizing, investigating, analyzing, and drawing conclusions.
3. Accurate data can be analyzed to support or refute a hypothesis.
4. It is essential to follow safety protocol when conducting an experiment in the lab or in the field.
5. The relationship between mass, volume and density using metrics.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

1. The difference between an observation and an inference.
2. How to design an experiment to test a hypothesis.
3. Evidence is key to accepting or rejecting a hypothesis.
4. How to use the units of the metric system.

5. Laboratory safety procedures.
6. How to calculate length, mass, volume and density of a given object using correct procedure and metric units.

Skills

Skills

Student will be skilled at …

1. How to differentiate between an observation and an inference.
2. Compare and contrast theories and laws.
3. Using laboratory equipment correctly and safely.
4. Identify tools skills scientists use.
5. Collecting, recording, analyzing, and reporting data, using metric terminology.
6. Create and design using acquired measurement skills.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

See learning activities

Teacher prepared notes/labs

Teacher prepared tests/quizzes

Science- Level Red- Glencoe

internet

videos (BrainPop)

https://www.youtube.com/watch?v=hz6ghvVbKpY

Back to school night powerpoint

Formative Assessment Strategies

Formative Assessment Strategies

lab conclusions

exit tickets

Science Starters

quizzes

Tests

Dinner with a Scientist

termite lab

types of bridges- pre-assessment

Dinner Scientist Directions.docx
Termite Labs pages 21-23

types of bridges
6th_Grade_Science_Benchmark-_1st_9_weeks.docx

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Note: This is a possible flow of lessons: materials for completing this sequence are chosen from, but not limited to the list below. Additionally, subsequent LA sections will read without this level of specificity.

Week 1

- Students draw their concept of a scientist
- Students explore the different branches of science
- Students are assigned a current scientist to 'take to dinner' where they discuss what the scientist does, what they do when not working, their inspiration and their goals. Students present findings to class.

Week 2

- Students begin learning about lab safety with ppt/notes/videos
- Students participate in lab safety/lab equipment circuit lab
- Close read- Hugh Herr- scientist
- assessment #1

Week 3

- notes over scientific method
- how to write a hypothesis
- hw- design a lab
- activity- the difference between observation/inference
- pseudo science vs real science
- termite lab

Week 4

- finish termite lab
- review beginning of the year/conclusion writing
- Assessment #1
- measuring in metrics
- Khan Academy flipped classroom
- Measuring scavenger hunt

Week 5

- Quiz over measuring length
- notes over measuring a regular solid
- measuring regular solids activity

Week 6

- measuring liquid volume notes
- measuring liquid volume lab
- measuring article
- Bill Nye measuring video
- pre-test

Week 7

- measuring liquid volume quiz
- notes over measuring an irregular solid- practice (with CB)
- measuring volume of an irregular solid activity then lab
- hw- ttb ppt- use chromebooks

Week 8

- go over ttb notes/students do tutorial in class for practice
- mass lab
- density notes/practice (using CB)
- density lab

Week 9

- students will use the skills obtained from the activities to create and design a bridge that can hold a specific mass and fit a specific space

http://edu.the3doodler.com/lessons/stem-bridging-the-gap/

mystery-footprints-Observation_Inference-isn.ppt
sci_method_notes1.docx
footprints-isn.pdf
qual-quan-obs-inf-hw-isn.pdf
termite video (experimental design lab)
http://www.pbs.org/wgbh/nova/blogs/secretlife/
lab_safety_station_lab.pdf
Khan Academy tutorial- customary vs metric
volume in class practice
Khan academy metric notes.docx
volume homework
notesheet for reg. volume notes and minilab
measuring liquid volume lab
outdoor measuring activity.docx
volume of irregular soilds/mass
triple beam balance ppt.ppt
goes with ppt
notes/lab set-up
triple beam balance tutorial
instructions for online tbb tutorial
1st tbb tutorial to complete
density lab
density problems
npr article/video- cardboard bicycle
Archimedes Principle video
intro into density notes, sample problems
article "Lawn Chair Larry"
Lawn Chair Larry video
Penny Boat Challenge
benchmark exam
design a lab.docx
Lab equipment quiz.pptx
how do animals see?
Metric measuring notes.docx
practice measuring in cm.docx
metric measuring video..use with notes
Science Test #1.docx
Lab equipment quiz.pptx
volume of a regular solid song
archimedes prin. video- serious
Volume of Irregular Solids Lab.docx
On-Line Density Tutorial.doc
ttb tutorial #1
ttb tutorial #2
density tutorial
water displacement video
Liquid Volume Notespg.docx
Density Lab.docx
On-Line Density Tutorial.doc
hindenburg explosion
http://www.airships.net/hindenburg/interiors
Science Lab equipment.pptx
Branches of Science.pptx
Science_Lab_Safety_Rules_(1) (1).pptx
What_is_Science_(1) (1).pptx
Rules_for_writing_a_hypothesis (1).docx

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, GIfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps

prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.