Unit: OTP 9 Fundamentals of Science

Content Area: **Science**
Course(s): **OTP Science**
Time Period: **year**
Length: **40 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. Students will explore the building blocks and properties of matter and how matter changes. They will also explore how and why things work and move.

Transfer

Students will be able to independently use their learning to...

- follow the Scientific Method to answer unknown questions.
- measure items they need in everyday life with the appropriate tool.
- identify properties of different substances and how to properly handle and use them.
- explore qualities of and demonstrate appropriate use of machines and electricity and magnets.

What kinds of long term, independent accomplishments are desired?

- Students should be able to use a procedure to find the answer to an unknown question.
- Students should be able to use various measuring tools in every day situations.
- Students should be able to identify and handle various every day chemicals and substances properly.
- Students should be able to identify and demonstrate the safe use of machines, electricity and magnets.

Meaning

Understandings

Students will understand that...

- many questions can be answered if you follow a specific method to answer them.
- measurement is a critical component of everyday life.
- everyday substances and chemicals can be dangerous and need to be handled and used properly.
- it is critical to be safe around machines and electricity.

What inferences should they make/grasp/realize?

- Students should understand that the Scientific Method is a good way to find the answer to a question.
- Stdents should understand how and when to use measuring tools.
- Students should realize that household chemicals can be dangerous to their health and they have to use them appropriately.
- Students should be aware that machines and electicity can be dangerous and need to be handled properly.

Essential Questions

- What is the Scientific Method?
- Why do we need the Scientific Method?
- How do we use the Scientific Method
- Why do we need to measure things a certain way?
- What are important things we need to measure?
- What are the basic tools we need to measure things?
- How do we use measuring tools?
- What is matter and why is it important?
- Why is water important?
- What are the properties of matter?
- What are mixtures and compounds and why are they important?
- What are chemicals?
- What are acids and bases and why are they important?
- How do I use and handle chemicals properly?
- What are machines and why are they important?
- What is energy and work?
- What is heat and friction?
- What is electricity and why is it important?
- What are magnets and why are they important?
- How do I use machines properly?
- How do I use electricity properly?

Application of Knowledge and Skill

Students will know...

Students will know...

- how to use the Scientific Method to answer an unknown question.
- how and when to use various measuring tools (thermometer, clock, scale, measuring cups and spoons, ruler/tape measurer, microscope).
- the phases of matter, mixtures and compounds and examples of each.
- examples of acid and bases and the proper use and handling of various household materials and chemicals.
- how to handle and use various everyday machines.
- how to safely work with electricity.

What facts and basic concepts should students know and be able to recall?

- Students should know the steps of the Sceintific Method and be able to identify the procedure for each step.
- Students should be able to indentify measuring tools they need in their everyday lives and use each tool correctly and for the appropriate purpose.
- Students should be able to give examples of the phases of matter, mixtures and compounds.
- Students should be able to give examples of acids and bases and identify proper handling techniques of household chemicals.
- Students should know that water is essential for plant and animal life and is a component of many substances.
- Students should know that machines can be very useful but can also be dangerous and should be able to demonstrate the safe use of everyday machines.
- Students should be able to demonstrate how to safely work around items that use electricity.

Students will be skilled at...

Students will be skilled at...

- using the Scientific Method to answer a question.
- using various measuring tools for everyday purposes.
- demonstrating the safe use of every day materials and chemicals.
- operating machines (electric and non-electric) to complete various tasks of daily life.

Learning Goal 9-1

- Students will use the Scientific Method to answer unknown questions.

9-12.HS-PS1-3.3.1	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

Academic Vocabulary

Scientific Method	Measurement	Matter		Work	
question/ problem	scale	solid	melting	energy	wheel and axle
research	balance	liquid	freezing	potenetial energy	sound
hypothesis/ prediction	thermometer	gas	boiling	kinetic energy	electricity
experiment	analog clock	plasma	vaporization	light energy	static electricity
procedure	digital clock	atom	boiling point	heat energy	conductor
materials	stopwatch	element	the periodic table	electrical energy	insulator
observation	timer	compound	nucleus	chemical energy	battery
data	measuring cup	mixture		mechanical energy	generator
conclusion	measuring spoon	acid		force	circuit
laboratory	beaker	base		gravity	fuse
	flask	proton		friction	magnet
	buret	electron		motion	magnetic field
	pipet	neutron		lubricant	
	ruler	evaporation		inertia	
	yard stick	condensation		machine	
	measuring tape	sublimation		work	
	microscope	water vapor		lever	
	magnifying glass	physical property		fulcrum	
	weight	chemical property		pulley	
	mass	solution		inclined plane	
	volume	physical change		screw	
	density	chemical change			
	area				

Target 1

- Students will be able to identify the steps of the Scientific Method.

Target 2

- Students will be able to explain each step of the Scientific Method.

Target 3

- Students will be able to complete an experiment using the Scientific Method.

Learning Goal 9-2

- Students will understand the purpose of and demonstrate the proper usage of various types of measurement tools in the classroom.

SCI.K-12.5.4	All students will develop an understanding of technology as an application of scientific principles.
SCI.K-12.5.4.1	Recognize tools and their functions (e.g., know that a scale is used to measure weight).
SCI.K-12.5.4.2	Select the most appropriate tool to complete a task.
SCI.K-12.5.4.3	Utilize tools for everyday purposes (e.g., use a thermometer to determine temperature).

Target 1

- Students will be able to identify basic measuring tools used in everyday life.

Target 2

- Students will be able to select the appropriate tool to make a measurement.

Target 3

- Students will correctly read a measurement apparatus and apply the information appropriately base on the situation.

Learning Goal 9-3

- Students will explore the properties of matter and how it effects them in their everyday lives.

HE.K-12.2.1.2	Identify potentially dangerous or threatening activities or situations.
HE.K-12.2.1.3	Identify and use emergency procedures when appropriate.
9-12.HS-PS1-1.PS1.A.1	Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons.
9-12.HS-PS1-6.PS1.A.1	The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms.
9-12.HS-PS1-2.PS1.B.1	The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions.
AAAA.K-12.5.1	Follow safety rules and procedures during activities, at home, at school and in the community.

Target 1

- Students will be able to differentiate between the states of matter and identify the properties of each.

Target 2

- Students will be able to sort various items based on their state.

Target 3

- Students will be able to identify and give examples of physical and chemical changes in matter.

Target 4

- Studenta will be able to differentiate between and give examples of mixtures and compounds.

Target 5

- Students will be able to identify the properties of acids and bases and give examples of each.

Target 6

- Students will understand that chemical reactions in many household items can cause them to be dangerous and will give examples of dangerous chemicals as well as demonstrate their safe handling.

Learning Goal 9-4

- Students will explain how machines work and will demonstrate the proper use of various familiar machines properly and safely.

SCI.K-12.5.4.1	Recognize tools and their functions (e.g., know that a scale is used to measure weight).
SCI.K-12.5.4.2	Select the most appropriate tool to complete a task.
SCI.K-12.5.4.3	Utilize tools for everyday purposes (e.g., use a thermometer to determine temperature).
SCI.K-12.5.9.2	Demonstrate safe use of electricity in daily living, employment, and recreation (e.g., use household appliances safely).

Target 1

- Students will describe different types of energy as it relates to matter.

Target 2

- Students will describe the effect of gravity and friction on every day objects.

Target 3

- Describe how electricity and magnets work.

Target 4

- Students will explain how basic machines work and will demonstrate the proper procedures when using every day machines.

Summative Assessment

Link to summative assesment guidelines and tools: http://www.edudemic.com/summative-and-formative-assessments/

https://sites.educ.ualberta.ca/staff/olenka.bilash/Best%20of%20Bilash/summativeassess.html

- End of semester exam
- End of unit or chapter test
- Essay or report
- Oral examination
- Participation in lecture, discussion or group work
- Performance in task with rubric or checklist
- Presentation

- Projects
- Structured observation

21st Century Life and Careers

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.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.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

Formative Assessment and Performance Opportunities

Link to formative assesment guidelines and tools: http://www.edudemic.com/summative-and-formative-assessments/

https://www.nwea.org/blog/2016/take-three-55-digital-tools-and-apps-for-formative-assessment-success/

https://docs.google.com/presentation/d/1nzhdnyMQmio5lNT75ITB45rHyLISHEEHZlHTWJRqLmQ/pub?start=false&loop=false&delayms=3000#slide=id.gb49e70aa_370

- Do now
- Exit ticket
- Graphic organizer
- Questioning/ discussion
- Role play
- Simulation
- Task analysis
- Task rubric
- Teacher observation
- Think-pair-share

- Visual representation
- Weekly quiz
- Work product

Accommodations/Modifications

Lessons and accompanying activities will be presented verbally, in writing and with visual examples of varying complexity to accommodate unique learning styles. Extra staff will be available to students to provide prompting and support. Assessment of skills will be varied based on ability level and will include written tests, projects and summative activities.

- 1:1 instruction
- Community- based instruction
- Cueing/prompting
- Reinforcement activities
- Role playing/ simulation
- Small group instruciton
- Visual supports

Unit Resources

- Activity Book: Steck Vaughn "Focus on Science" Level C and E
- Board games
- Book "Leveled Texts for Science- Physical Science"
- Book "Pacemaker General Science"
- Book "Science Explorer- Chemical Building Blocks" Pearson Prentice Hall
- Book "Science Explorer- Chemical Interactions" Pearson Prentice Hall
- Book "Super Science Concoctions" Jill Frankel Hauser
- Book: Teacher Created Resources "Magnets and Electricity Super Science Activities"
- Book: Evan Moore "Energy" Scienceworks for Kids Series
- Book: Evan Moore "Simple Chemistry" Sciencworks for Kids Series
- Book: Janice VanCleave's "201 Awesome, Magical, Bizarre and Incredible Experiments"
- Interactive activities
- Janice VanCleave's "202 Oozing, Bubbling, Dripping and Bouncing Experiments"
- Janice VanCleaves "203 Icy, Freezing, Frosty, Cool and Wild Experiments"
- Online activities
- Video presentations