



Grade 8 Science – Course 3
Unit 1 – Physical Science
Topic 1 Atoms and the Periodic Table – 22 Days

Unit Overview - Students will look at patterns as they explore atomic theory, structure, bonding, and acids and bases. This will lead to an understanding of chemical reactions and how materials are created. The final topic of forces and motion allow for students to build upon prior knowledge while having students construct and study models to explain the relationship between speed, velocity, and acceleration.

Topic Essential Question: How do atoms combine to form extended structures?

Lessons

- Topic Launch/Quest Kickoff
- Lesson 1 Atomic Theory
- Lesson 2 Periodic Table
- Lesson 3 Bonding and the Periodic Table
- Lesson 4 Types of Bonds
- Lesson 5 Acids and Bases
- Topic Close – Assessment, Quest Findings

NYSSLS Performance Expectations

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.

[Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of particulate-level models could include drawings, 3D ball and stick structures, or computer representations showing different substances with different types of atoms.] [Assessment Boundary: Assessment does not include valence electrons and bonding energy, discussing the individual ions composing complex structures, or a complete depiction of all individual atoms in a complex molecule or extended structure.]

Topic Opener

PE: MS-PS1-1

SEP: Asking Questions and Defining Problems;
Obtaining, Evaluating, and Communicating Information

DCI:

PS 1.A – Structures and Properties of Matter

- (NYSED) Substances are made of one type of atom or combinations of different types of atoms. Individual atoms are particles and can combine to form larger particles that range in size from two to thousands of atoms. (MS-PS1-1)
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)

Savvas

Highlighted labs are important to the understanding of the instructional concepts in this lesson and must be completed during Science instructional time.

- Topic Readiness Test
- **uConnect Lab – Modeling Matter**
- Quest Kickoff Video – How can you use chemistry to solve a culinary mystery?

Lesson 1 – Atomic Theory

PE:MS-PS1-1

SEP: Developing and Using Models

DCI:

PS 1.A – Structures and Properties of Matter

- (NYSED) Substances are made of one type of atom or combinations of different types of atoms. Individual atoms are particles and can combine to form larger particles that range in size from two to thousands of atoms. (MS-PS1-1)
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CCC: Scale, Proportion, and Quantity

zSpace Activity Code (Code)

The Lighter Side of Chemistry (AP24)

[The Lighter Side of Chemistry - Teacher Activity Plan](#)

In this activity, students will review the elements' symbols.

[The Lighter Side of Chemistry - Student Worksheet](#)[The Lighter Side of Chemistry - Student Worksheet](#)[GoogleDoc](#)**Savvas****Guiding Objectives:**

- Students will identify and describe the properties of electrons, protons, and neutrons.
- Students will describe the development of atomic theory including: The historical atomic models of Dalton, Thomson, Rutherford, and Bohr; how data from experiments caused the theory to change; the basics of modern atomic theory.
- Students will cite evidence that supports the modern models of the atom, including: Rutherford's gold foil experiment; Chadwick's discovery of the neutron.

Literacy Connection

- Determine Central Ideas

Vocabulary

- | | |
|------------|-----------------|
| ● atom | ● neutron |
| ● electron | ● atomic number |
| ● nucleus | ● isotope |
| ● proton | ● mass number |

Academic Vocabulary

- theory

Connect - TE/SB p.4

- Connect It!
- Quest Connection
- Inquiry Warm-Up Lab: What's in the Box?

Investigate - TE/SB pp.5-11

- **Investigate Lab – How Far Away Is the Electron?**
- Video – Isotopes of Hydrogen
- Interactivity – Build an Atom
- Model It! (p.9)
- Literacy Connection (p.6)
- Reading Checks (pp.5; 9)

Synthesize - TE/SB pp. 12

- Interactivity – Models of Atoms

Demonstrate – TE/SB p.13

- Lesson 1 Check
- Lesson Quiz 1

Lesson 2 – The Periodic Table**PE:** MS-PS1-1**SEP:** Developing and Using Models**DCI:****PS 1.A** – Structures and Properties of Matter

- (NYSED) Substances are made of one type of atom or combinations of different types of atoms. Individual atoms are particles and can combine to form larger particles that range in size from two to thousands of atoms. (MS-PS1-1)
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)

CCC: Patterns**Savvas****Guiding Objectives:**

- Students will identify and describe the organization used to create the periodic table.
- Students will describe the development of the periodic table.
- Students will interpret the use of the periodic table: For locating important information pertaining to the elements; to describe the elements.

Literacy Connection

- Determine Central Idea

Vocabulary

- atomic mass
- periodic table
- chemical symbol
- period
- group

Academic Vocabulary

- representation

Connect - TE/SB p. 16

- Connect It!
- Quest Connection
- Inquiry Warm-Up Lab: Which is Easier?

Investigate - TE/SB pp. 17-24

- Video – Major Patterns in the Periodic Table
- **Investigate Lab – Classifying Elements**
- Interactivity – Organization of the Periodic Table
- Interactivity – Interactive Periodic Table
- Literacy Connection (p.17)
- Math Toolbox (p.21)
- Reading Check (p.18)
- Question It!(p.23)

Synthesize - TE/SB p. 25-27

- Interactivity – Groups of Elements
- Quest Check-In Interactivity: Examining Physical Properties of the Powders
- Reading Check (p.26)
- Quest Check-In

Demonstrate – TE/SB p.27

- Lesson 2 Check
- Lesson 2 Quiz

CLRI Connections:

- Information Sheet: [James Andrew Harris](#)
James Andrew Harris grew up in Texas and California. In the 1960s and 1970s, he carried out his most well-known work at Lawrence Berkeley National Laboratory. With his team he discovered two elements: element 104, rutherfordium, and 105, dubnium.

CLRI Connections:

	<ul style="list-style-type: none"> ● Nearpod with 2 short Videos (preview; add to library) <u>Video 1 (1:10) - Highlighting Minorities in STEM</u> – James Andrew Harris. This slideshow highlights Mr. Harris, the first African American credited in the discovery of an element. <u>Video 2 (1:17)</u>– This short newsclip from 1969 explains the discovery of element 104 and introduces some members of the team, including James Andrew Harris
<p><u>Lesson 3 – Bonding and The Periodic Table</u> PE: MS-PS1-1 SEP: Developing and Using Models DCI: PS 1.A – Structures and Properties of Matter</p> <ul style="list-style-type: none"> ● (NYSED) Substances are made of one type of atom or combinations of different types of atoms. Individual atoms are particles and can combine to form larger particles that range in size from two to thousands of atoms. (MS-PS1-1) ● Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1) <p>CCC: Scale, Proportion, and Quantity</p>	<p>Savvas Guiding Objectives:</p> <ul style="list-style-type: none"> ● Students will cite evidence that interpret data to: Explain the role of valence electrons in the bonding of atoms; describe how the properties of atoms are affected when atoms bond together; compare the properties of metals and nonmetals ● Students will develop and use models to: Describe and compare the properties of atoms; explain the role of valence electrons in the structure and function of atoms. <p>Literacy Connection</p> <ul style="list-style-type: none"> ● Support Claims <p>Vocabulary</p> <ul style="list-style-type: none"> ● compound ● valence electron ● reactivity ● malleable ● ductile ● luster ● semiconductor <p>Academic Vocabulary</p> <ul style="list-style-type: none"> ● interpretation ● transfer <p>Connect - TE/SB p.28</p> <ul style="list-style-type: none"> ● Connect It! ● Quest Connection ● Inquiry Warm-Up Lab: What Are the Trends in the Periodic Table? <p>Investigate - TE/SB pp. 29-33</p> <ul style="list-style-type: none"> ● <i>u</i>Investigate Lab – Element Chemistry* ● Video – Modeling an Atom ● Interactivity – Valence Electrons ● Literacy Connection (p.29)

	<ul style="list-style-type: none"> ● Reading Check (p.31) ● Question It! (p.32) <p>Synthesize - TE/SB pp. 34-36</p> <ul style="list-style-type: none"> ● Interactivity – Transferring Energy Through Bonding ● Quest Check-In Interactivity: The Iodine Test for Starch ● Reading Check (p.35) ● Quest Check-In <p>Demonstrate – TE/SB p.36</p> <ul style="list-style-type: none"> ● Lesson 3 Check ● Lesson 3 Quiz <p>*Denotes accompanying lab video</p>
<p><u>Lesson 4 – Types of Bonds</u> PE: MS-PS1-1 SEP: Developing and Using Models DCI: PS 1.A – Structures and Properties of Matter</p> <ul style="list-style-type: none"> ● (NYSED) Substances are made of one type of atom or combinations of different types of atoms. Individual atoms are particles and can combine to form larger particles that range in size from two to thousands of atoms. (MS-PS1-1) ● Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1) <p>CCC: Scale, Proportion, and Quantity</p>	<p>Savvas Guiding Objectives:</p> <ul style="list-style-type: none"> ● Students will recognize that: A finite number of elements exist; atoms combine to produce compounds that make up all living and nonliving things. ● Students will identify basic examples of atoms. ● Students will compare and classify properties of various compounds including acids, bases, and salts. <p>Literacy Connection</p> <ul style="list-style-type: none"> ● Make Generalizations <p>Vocabulary</p> <ul style="list-style-type: none"> ● ion ● polyatomic ion ● ionic bond ● covalent bond ● molecule ● nonpolar bond ● polar bond <p>Academic Vocabulary</p> <ul style="list-style-type: none"> ● component <p>Connect - TE/SB p.38</p> <ul style="list-style-type: none"> ● Connect It! ● Quest Connection ● Inquiry Warm-Up Lab – How Do Ions Form? <p>Investigate - TE/SB pp. 39-45</p> <ul style="list-style-type: none"> ● Investigate Lab – Properties of Molecular Compounds ● Video – What Makes Water Unique ● Interactivity – Build an Ionic Compound ● Interactivity – Ionic or Covalent Bonding ● Virtual Lab – Protect the Helpers! ● Model It! (p.40) ● Reading Check (pp. 41; 44) ● Literacy Connection (p.43) <p>Synthesize - TE/SB pp. 45-47</p> <ul style="list-style-type: none"> ● Interactivity – Chemical Bonding ● Quest Check-In Interactivity – The Vinegar Test ● Quest Check-In ● Reading Check (p.46) ● Math Toolbox (p.46) <p>Demonstrate – TE/SB p.47</p> <ul style="list-style-type: none"> ● Lesson 4 Check ● Lesson 4 Quiz

<p><u>Lesson 5 – Acids and Bases</u> PE: MS-PS1-1 SEP: Developing and Using Models DCI: PS 1.A – Structures and Properties of Matter</p> <ul style="list-style-type: none"> (NYSED) Substances are made of one type of atom or combinations of different types of atoms. Individual atoms are particles and can combine to form larger particles that range in size from two to thousands of atoms. (MS-PS1-1) (NYSED) Each substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-3),(MS-PS1-7)(Note: This Disciplinary Core Idea is also addressed by MS- PS1-2.) <p>CCC: Patterns</p>	<p>Savvas Guiding Objectives:</p> <ul style="list-style-type: none"> Students will use evidence to list and describe: The properties of acids; the properties of bases Students will analyze and interpret data to explain what happens when acids and bases interact. <p>Literacy Connection</p> <ul style="list-style-type: none"> Evaluate Reasoning <p>Vocabulary</p> <ul style="list-style-type: none"> acid corrosive indicator base neutralization salt <p>Academic Vocabulary</p> <ul style="list-style-type: none"> process <p>Connect - TE/SB p.48</p> <ul style="list-style-type: none"> Connect It! Quest Connection Inquiry Warm-Up Lab – What Can Cabbage Juice Tell You? <p>Investigate - TE/SB pp. 49-52</p> <ul style="list-style-type: none"> Investigate Lab – Properties of Acids and Bases Video – Baking Soda and Vinegar React Interactivity – Properties and Uses of Acids and Bases Interactivity – Acids and Bases in Careers Model It! (p.40) Reading Check (pp. 49; 51; 52) Plan It! (p.52) Literacy Connection (p.49) <p>Synthesize - TE/SB pp. 53-54</p> <ul style="list-style-type: none"> Interactivity – Acid Rain Quest Check-In Lab – Solving the Mystery Quest Check-In Reading Check (p.53) <p>Demonstrate – TE/SB p.53</p> <ul style="list-style-type: none"> Lesson 4 Check Lesson 4 Quiz
<p><u>Topic Close</u></p> <ul style="list-style-type: none"> Topic 1 Assessment and Remediation TE/SB pp. 56-59 	<p><u>Topic 1 Enrichment</u> Topic 1 - Lesson 1 Enrichment</p>

<ul style="list-style-type: none"> ● Quest Finding and Reflection TE/SB p. 59 	<ul style="list-style-type: none"> ● Case Study – Unlocking the Power of the Atom (pp.14-15) Topic 1- Lesson 2 Enrichment ● Enrichment – Mystery of the Unknown Element Topic 1 - Lesson 3 Enrichment ● Enrichment – All That Glitters is not Gold ● <i>u</i>Engineer It! – When Particles Collide (p.37) Topic 1 - Lesson 4 Enrichment ● Enrichment – Covalent Bonds Topic 1 - Lesson 5 Enrichment ● Enrichment – Acids and Bases in Nature ● Extraordinary Science – Acids in the Human Body
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<p>English Language Learners (ELL) Enhancements To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p><u>Listening</u></p> <ul style="list-style-type: none"> ● <u>Cross- Linguistic Practices:</u> Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates). ● <u>Activating Prior Knowledge</u> Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content. ● <u>Visuals</u> - GIFs, pictures- will assist students in understanding what they are listening to. Use <u>visual thinking strategies</u> to set the lens for learning. ● Video to review or introduce a topic – use <u>closed captioning</u> to help students see the words and pronunciations while they listen to the content. ● <u>Word stretching / Vowel stretching</u> when instructing allows students to listen closely to the pronunciation of the word. ● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening. Scroll for grade 8.
	<p><u>Speaking</u></p> <ul style="list-style-type: none"> ● <u>Sentence Stems/Frames</u> - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i> ● <u>Academic Conversation Starters:</u> Have a visual of a list of academic sentence starters that students can refer to in a discussion. ● <u>Choral Reading</u> - To build fluency, self-confidence and motivation with reading/speaking. ● Create <u>movement</u> to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning. ● <u>Performance Level Descriptors</u> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. Scroll for grade 8.
	<p><u>Reading</u></p> <ul style="list-style-type: none"> ● Supplementary Text to help reinforce concepts. ● <u>Visual Aids</u> - Pictures or models to support vocabulary words and concepts ● Video to review or introduce a topic - use <u>closed captioning</u> to help students read along while they listen to the content. ● <u>4 Square / Frayer models</u> to help students gain a deeper understanding of vocabulary. ● <u>Highlighting</u> important text to assist students in answering questions after the reading. ● <u>Chunking</u>-Break reading of text into chunks or paragraphs ● <u>Vocabulary Morphology</u>- Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary.

	<ul style="list-style-type: none"> ● Performance Level Descriptors this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of reading. Scroll for grade 8. <p><u>Instructional Accommodations (depending on the student’s needs)</u></p> <ul style="list-style-type: none"> ● Extended time for tests in class, projects and assignments ● Directions read. Broken down as necessary ● Model how to complete the activity in the lesson ● Oral simplification of directions or questions ● Translated version of test when available. Student may have both version English and native language version ● Use of approved bilingual glossaries from NYS in each subject
<p>Special Education Modifications</p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><u>Instructional</u></p> <ul style="list-style-type: none"> ● Pre-teach vocabulary ● Use picture vocabulary ● Scaffold Depth of Knowledge questions ● Provide copy of notes/notes in “cloze” form ● Use of Think, Pair, and Share strategy to help process information ● Scaffold written assignments with the use of graphic organizers ● Allow for multiple ways to respond (verbal, written, response board) ● Provide model of performance task ● Modify informational text to fit the needs of the students ● Provide a digital or paper interactive notebook ● Present complex tasks in multiple ways ● Provide mnemonic strategies for scientific concepts <p><u>Technology:</u></p> <ul style="list-style-type: none"> ● Audio reading of text ● Text to type functions ● Videos to clarify/visualize science concepts ● Record class lecture/discussions and make accessible to student ● Nearpod- interactive presentations of notes <p><u>In Class Assessments</u></p> <ul style="list-style-type: none"> ● Provide multiple options for projects ● Use of timer in class ● Break all complex tasks into chunks
<p>Step Up to Writing</p> <p>Step Up to Writing Materials can be found in BPS Science K-12 Schoology Folder □ Grade 8 Resources □ Grade 8 SUTW materials</p>	<ul style="list-style-type: none"> ● Easy Two-Column Notes ● Breaking Down Definitions ● Paragraph Frame- What I Learned ● Performance Level Descriptors this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. Scroll for grade 8.
<p>Culturally and Linguistically Responsive Teaching (CLRT) in the Science</p>	<ul style="list-style-type: none"> ● Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications ● Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population ● All students are given an opportunity to engage in science discourse ● Teacher demonstrates high expectations for all students

Classroom	
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