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Chapter Title: **Chapter 1 Introduction to Chemistry**

Chapter Question: **How is chemistry a science that is central to our lives?**

Chapter Overview Template	
Content Area: **Science**	
Target Course/Grade Level: **Science Grades 10-12**	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: **5.1 Science Practices:** All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: **A. Understand Scientific Explanations**: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #1.3, #1.4 SE: 13, 21 *ChemLab* 24 *Launch Lab* 3	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 *ChemLab* 24 *Launch Lab* 3	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 24	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #1.3, #1.4 SE: 12-15, 21 *ChemLab* 24 *Launch Lab* 3	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 24 *Launch Lab* 3	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #1.3, #1.4 SE: 13, 21 *ChemLab* 24	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #1.3, #1.4 SE: 13, 21 *ChemLab* 24 *Launch Lab* 3	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #1.1, #1.3, #1.4 SE: 5-8, 13, 20-21 *ChemLab* 24	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #1.1, #1.4 SE: 5-8, 20-21 *ChemLab* 24	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 24 *Launch Lab* 3	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 24	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 24	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #1.4 SE: 19 *Launch Lab* 3	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Essential Questions: • Why study chemistry? • What is the relationship between branches of chemistry and different kinds of matter? • How do scientists use scientific methods? • How can scientific research result in the development of technology that can improve our lives and the world around us?	

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***Chemistry: Matter and Change* © 2008**
Chapter Title: Chapter 2 Analyzing Data
Chapter Question: What are ways chemists collect and analyze data?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #2.3 SE: 50 *ChemLab* 60 *Launch Lab* 31	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #2.1, #2.3 SE: 32-39, 50 *ChemLab* 60 *Launch Lab* 31	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #2.3 SE: 50 *ChemLab* 60 *Launch Lab* 31	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #2.3 SE: 47-54 *ChemLab* 60 *Launch Lab* 31	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #2.1, #2.3 SE: 39, 50 *ChemLab* 60 *Launch Lab* 31	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #2.1, #2.3 SE: 39, 50 *ChemLab* 60 *Launch Lab* 31	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #2.3 SE: 47-54 *ChemLab* 60 *Launch Lab* 31	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 *ChemLab* 60 *Launch Lab* 31	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 *ChemLab* 60 *Launch Lab* 31	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 60 *Launch Lab* 31	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 60	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #2.1, #2.4 SE: 39, 55-58 *ChemLab* 60	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #2.1 SE: 39 *ChemLab* 60 *Launch Lab* 31	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Essential Questions: • What system do chemists use to communicate their findings? • How do scientists express numbers and convert between units in scientific research? • How do scientists calculate uncertainty in data? • What are ways scientists visually depict data, making it easier to see patterns and trends?	

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***Chemistry: Matter and Change* © 2008**
Chapter Title: Chapter 3 Matter---Properties and Changes
Chapter Question: What are properties of matter?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #3.3 SE: 82 *ChemLab* 92 *Launch Lab* 69	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 *ChemLab* 92 *Launch Lab* 69	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 92	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #3.3 SE: 82 *ChemLab* 92 *Launch Lab* 69	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 92 *Launch Lab* 69	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #3.1 SE: 72 *ChemLab* 92 *In the Field* 91 *Launch Lab* 69	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 *ChemLab* 92 *In the Field* 91	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 *ChemLab* 92 *Launch Lab* 69	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #3.3 SE: 82 *ChemLab* 92	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section #3.3 SE: 82 *ChemLab* 92	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 Section #3.3 SE: 82 *ChemLab* 92	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #3.3 SE: 82	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #3.3 SE: 82 *ChemLab* 92 *Launch Lab* 69	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Essential Questions: • What are properties of matter? • What are physical and chemical changes of matter? • What are mixtures of matter? • What is a compound?	

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***Chemistry: Matter and Change* © 2008**
Chapter Title: Chapter 4 The Structure of the Atom
Chapter Question: What are atoms?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #4.1, #4.2, #4.3 SE: 102-105, 106-114, 120 *ChemLab* 126 *Launch Lab* 101	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #4.2, #4.3 SE: 113, 120 *ChemLab* 126	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #4.3 SE: 120 *ChemLab* 126	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #4.3 SE: 120 *ChemLab* 126 *Launch Lab* 101	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #4.2, #4.3 SE: 106-114, 120 *ChemLab* 126	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #4.1, #4.2, #4.3 SE: 102-105, 106-114, 120 *ChemLab* 126 *Launch Lab* 101	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #4.2, #4.3 SE: 113, 120 *ChemLab* 126	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #4.1, #4.2 SE: 102-105, 106-114 *ChemLab* 126 *Launch Lab* 101	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #4.1, #4.2, #4.3 SE: 102-105, 106-114, 120 *ChemLab* 126 *Launch Lab* 101	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section #4.1, #4.2 SE: 102-105, 106-114 *ChemLab* 126	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 126	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 126	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #4.3 SE: 120 *ChemLab* 126	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section #4.2 SE: 106-114	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: In a neutral atom, the positively charged nucleus is surrounded by the same number of negatively charged electrons. Atoms of an element whose nuclei have different numbers of neutrons are called isotopes.	
5.2.12.A.4 Section #4.3, #4.4 SE: 117, 122-124	Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes.
Essential Questions: from the chapter opener pages • What were early ideas about matter? • How do you define an atom? • How are atoms different? • What is the relationship between unstable nuclei and radioactive decay?	

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Chapter Title: **Chapter 5 Electrons in Atoms**

Chapter Question: **How does the arrangement of electrons differ among atoms of different elements?**

Chapter Overview Template	
Content Area: **Science**	
Target Course/Grade Level: **Science Grades 10-12**	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: **5.1 Science Practices:** All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: **A. Understand Scientific Explanations**: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #5.1, #5.2 SE: 144, 146-155 *ChemLab* 164	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #5.1, #5.2 SE: 144, 150 *ChemLab* 164	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #5.1 SE: 144 *ChemLab* 164	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #5.1, #5.2 SE: 144, 150 *ChemLab* 164 *Launch Lab* 135	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #5.2 SE: 146-155 *ChemLab* 164	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #5.1, #5.2 SE: 144, 146-155 *ChemLab* 164 *Launch Lab* 135	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #5.1, #5.2 SE: 144, 150 *ChemLab* 164 *Launch Lab* 135	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #5.2 SE: 146-155 *ChemLab* 164 *Launch Lab* 135	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #5.2 SE: 146-155 *ChemLab* 164 *Launch Lab* 135	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section #5.2 SE: 146-155 *Launch Lab* 135	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *Launch Lab* 135	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #5.1 SE: 144 *Chemistry & Health* 163 *ChemLab* 164	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #5.1 SE: 144 *ChemLab* 164	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section #5.2, #5.3 SE: 146-155, 156-162	Use atomic models to predict the behaviors of atoms in interactions.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section #5.3 SE: 161-162	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Essential Questions: • What are the characteristics of light? • How do the properties of electrons help relate atomic emission spectra, energy states of atoms, and atomic orbitals? • What rules can be used to determine electron arrangement in an atom?	

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Chapter Title: Chapter 6 The Periodic Table and Periodic Law

Chapter Question: How can the physical and chemical properties of atoms be predicted?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #6.1, #6.3 SE: 174-181, 193 *ChemLab* 196	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #6.1 SE: 180 *ChemLab* 196	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #6.1 SE: 180 *ChemLab* 196	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #6.1, #6.3 SE: 180, 193 *ChemLab* 196	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 196	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #6.1, #6.3 SE: 174-181, 193 *ChemLab* 196	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #6.1 SE: 180 *ChemLab* 196	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #6.1 SE: 174-181 *ChemLab* 196	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #6.1, #6.3 SE: 174-181, 193 *ChemLab* 196	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section #6.1, #6.3 SE: 174-181, 193 *ChemLab* 196	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *Chemistry & Health* 195	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #6.3 SE: 193 *ChemLab* 196 *Launch Lab* 173	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 *ChemLab* 196 *Launch Lab* 173	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section #6.2 SE: 182-185	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section #6.1, #6.2, #6.3 SE: 177-181, 182-186, 187-194 *ChemLab* 196	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section #6.2 SE: 182-185	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Essential Questions: • How has the modern periodic table evolved over time? • How are elements organized on the periodic table? • What are the trends in properties of elements in the periodic table?	

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Chapter Title: **Chapter 7 Ionic Compounds and Metals**

Chapter Question: **How are the atoms of ionic compounds held together?**

Chapter Overview Template	
Content Area: **Science**	
Target Course/Grade Level: **Science Grades 10-12**	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: **5.1 Science Practices:** All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: **A. Understand Scientific Explanations**: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #7.4 SE: 227 *ChemLab* 230 *Launch Lab* 205	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #7.4 SE: 227 *ChemLab* 230 *Launch Lab* 205	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 230	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #7.2, #7.4 SE: 216, 227 *ChemLab* 230 *Launch Lab* 205	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 230 *Launch Lab* 205	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #7.4 SE: 227 *ChemLab* 230 *Launch Lab* 205	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 *ChemLab* 230 *Launch Lab* 205	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 *ChemLab* 230 *Launch Lab* 205	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 *ChemLab* 230 *Launch Lab* 205	Use data representations and new models to revise predictions and explanations.

Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 230	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 230 *Launch Lab* 205	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #7.4 SE: 227 *ChemLab* 230 *Launch Lab* 205	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section #7.1, #7.2 SE: 206-209, 210-212	Use atomic models to predict the behaviors of atoms in interactions.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section #7.1, #7.2, #7.4 SE: 206-209, 210-212, 225	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.

Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section #7.2, #7.4 SE: 214-215, 226	Account for any trends in the melting points and boiling points of various compounds.
Essential Questions: • How are ions formed? • How do charged ions form electrically neutral ionic compounds? • How are ionic compounds represented by written names and formulas? • What are properties and structure of metals?	

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Chapter Title: Chapter 8 Covalent Bonding
Chapter Question: How do covalent bonds form?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #8.1, #8.5 SE: 242, 269 *ChemLab* 272	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 *ChemLab* 272	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #8.5 SE: 269	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #8.1, #8.5 SE: 242, 269 *ChemLab* 272	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 272	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #8.1, #8.5 SE: 242, 269 *ChemLab* 272	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #8.5 SE: 269	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #8.1 SE: 242 *ChemLab* 272	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 *ChemLab* 272	Use data representations and new models to revise predictions and explanations.

Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *How It Works* 271	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #8.1 SE: 242 *ChemLab* 272	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #8.1 SE: 242 *ChemLab* 272	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section #8.1 SE: 240-246 *ChemLab* 272 *Launch Lab* 239	Use atomic models to predict the behaviors of atoms in interactions.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
Content Statement: An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	
5.2.12.B.1 Section #8.1 SE: 240-245	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.

Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section #8.1, #8.5 SE: 242, 269-270	Account for any trends in the melting points and boiling points of various compounds.
Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
Content Statement: The driving forces of chemical reactions are energy and entropy. Chemical reactions either release energy to the environment (exothermic) or absorb energy from the environment (endothermic).	
5.2.12.D.2 Section #8.1 SE: 247	Describe the potential commercial applications of exothermic and endothermic reactions.
Essential Questions: • Why do atoms form covalent bonds? • What are the rules for naming binary molecular compounds, binary acids, and oxyacids? • What information is conveyed by structural formulas? • How is molecular shape determined? • What determines the character of a chemical bond?	

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Chapter Title: Chapter 9 Chemical Reactions

Chapter Question: What are some common chemical reactions occurring in the world around us?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #9.2 SE: 294 *ChemLab* 310 *Launch Lab* 281	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #9.2 SE: 294 *ChemLab* 310 *Launch Lab* 281	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 310 *Launch Lab* 281	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #9.2 SE: 294 *ChemLab* 310 *Launch Lab* 281	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #9.2 SE: 294 *ChemLab* 310	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #9.2 SE: 294 *ChemLab* 310 *Launch Lab* 281	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #9.2 SE: 294 *ChemLab* 310	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #9.2 SE: 294 *ChemLab* 310 *Launch Lab* 281	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #9.2 SE: 294 *ChemLab* 310	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 310	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #9.2 SE: 294 *ChemLab* 310 *How It Works* 309	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #9.3 SE: 301 *ChemLab* 310 *Launch Lab* 281	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	
5.2.12.A.3 Section #9.2 SE: 294	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
Content Statement: Solids, liquids, and gases may dissolve to form solutions. When combining a solute and solvent to prepare a solution, exceeding a particular concentration of solute will lead to precipitation of the solute from the solution. Dynamic equilibrium occurs in saturated solutions. Concentration of solutions can be calculated in terms of molarity, molality, and percent by mass.	
5.2.12.A.5 Section #9.3 SE: 299-300	Describe the process by which solutes dissolve in solvents.
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 *How It Works* 309	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 Section #9.1, #9.2, #9.3 SE: 285-288, 295, 297, 301 *ChemLab* 310	Balance chemical equations by applying the law of conservation of mass.

Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: The driving forces of chemical reactions are energy and entropy. Chemical reactions either release energy to the environment (exothermic) or absorb energy from the environment (endothermic).	
5.2.12.D.2 Section #9.2 SE: 290-291	Describe the potential commercial applications of exothermic and endothermic reactions.
Essential Questions: • How are chemical reactions represented? • How are chemical reactions classified? • What kind of chemical reactions occur in aqueous solutions?	

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Chapter Title: Chapter 10 The Mole
Chapter Question: What does a mole represent?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #10.2 SE: 326 *ChemLab* 356 *Launch Lab* 319	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #10.2, 10.4 SE: 326, 342 *ChemLab* 356 *Launch Lab* 319	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 356 *Launch Lab* 319	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #10.4 SE: 342 *ChemLab* 356 *Launch Lab* 319	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #10.2 SE: 326 *ChemLab* 356 *Launch Lab* 319	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #10.2 SE: 326 *ChemLab* 356 *Launch Lab* 319	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 *ChemLab* 356 *Launch Lab* 319	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #10.2 SE: 326 *ChemLab* 356 *Launch Lab* 319	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #10.2 SE: 326 *ChemLab* 356 *Launch Lab* 319	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *Launch Lab* 319	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *Launch Lab* 319	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 356	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #10.4 SE: 342 *ChemLab* 356	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Essential Questions:

- How do chemists use moles?
- What is the relationship between a mole and the mass of a substance?
- How is molar mass calculated and used?
- How are empirical and molecular formulas related?
- What is a hydrate?

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Chapter Title: Chapter 11 Stoichiometry
Chapter Question: What governs mass relationships in chemical reactions?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #11.2, #11.4 SE: 378, 387 *ChemLab* 390 *Launch Lab* 367	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #11.2, #11.4 SE: 378, 387 *ChemLab* 390	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #11.2 SE: 378 *ChemLab* 390 *Launch Lab* 367	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #11.2, #11.4 SE: 378, 387 *ChemLab* 390 *Launch Lab* 367	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #11.2, #11.4 SE: 378, 387 *ChemLab* 390	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #11.2, #11.4 SE: 378, 387 *ChemLab* 390	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #11.2 SE: 378 *ChemLab* 390	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 *ChemLab* 390	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #11.2 SE: 378 *ChemLab* 390	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 390	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 390	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #11.2 SE: 378	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #11.2 SE: 378 *ChemLab* 390 *Launch Lab* 367	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Essential Questions: • What determines how much product can form in a chemical reaction? • How are balanced chemical equations used to solve stoichiometric problems? • When does a chemical reaction stop? • What is percent yield?	

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Chapter Title: Chapter 12 States of Matter

Chapter Question: How can the different properties of solids, liquids, and gases be explained?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 *ChemLab* 432 *Launch Lab* 401	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #12.3 SE: 423 *ChemLab* 432 *Launch Lab* 401	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 432 *Launch Lab* 401	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #12.1 SE: 408 *ChemLab* 432 *Launch Lab* 401	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #12.3 SE: 423 *ChemLab* 432 *Launch Lab* 401	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 *ChemLab* 432 *Launch Lab* 401	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 *ChemLab* 432 *Launch Lab* 401	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 *ChemLab* 432 *Launch Lab* 401	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #12.3 SE: 423 *ChemLab* 432	Use data representations and new models to revise predictions and explanations.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 432	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #12.1 SE: 408 *ChemLab* 432	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 *ChemLab* 432 *Launch Lab* 401	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules.	
5.2.12.A.2 Section #12.1, #12.2, #12.3 SE: 402-406, 411-414, 415-424 *ChemLab* 432 *Everyday Chemistry* 431 *Launch Lab* 401	Account for the differences in the physical properties of solids, liquids, and gases.

Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Gas particles move independently and are far apart relative to each other. The behavior of gases can be explained by the kinetic molecular theory. The kinetic molecular theory can be used to explain the relationship between pressure and volume, volume and temperature, pressure and temperature, and the number of particles in a gas sample. There is a natural tendency for a system to move in the direction of disorder or entropy.	
5.2.12.C.1 Section #12.1, #12.2, #12.3 SE: 402-406, 408-409, 411-414, 415-424 *ChemLab* 432	Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases.
Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section #12.4 SE: 425-427 *ChemLab* 432	Account for any trends in the melting points and boiling points of various compounds.
Essential Questions: • How do the properties of gases relate to the arrangement of their particles? • What determines a substance's state at a given temperature? • How are particles arranged in solids and liquids? • What happens to matter when energy is added or removed?	

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Chapter Title: Chapter 13 Gases

Chapter Question: How do gases respond to changes in pressure, temperature, volume, and number of particles?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #13.1, #13.2 SE: 444, 457 *ChemLab* 466 *Launch Lab* 441	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #13.2 SE: 457 *ChemLab* 466 *Launch Lab* 441	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 466	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #13.2 SE: 457 *ChemLab* 466 *Launch Lab* 441	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #13.2 SE: 457 *ChemLab* 466 *Launch Lab* 441	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #13.1, #13.2 SE: 444, 457 *ChemLab* 466 *Launch Lab* 441	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 *ChemLab* 466	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #13.1 SE: 444 *ChemLab* 466 *Launch Lab* 441	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #13.1, #13.2 SE: 444, 457 *ChemLab* 466 *Launch Lab* 441	Use data representations and new models to revise predictions and explanations.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 466	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 466 *How It Works* 465	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #13.2 SE: 457 *ChemLab* 466	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Essential Questions: • How are the pressure, temperature, and volume of a fixed amount of gas related to each other? • What is the ideal gas law? • In chemical reactions involving gases, what do the coefficients in the balanced chemical equation represent?	

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Chapter Title: **Chapter 14 Mixtures and Solutions**

Chapter Question: **How many of the substances that make up our world are mixtures?**

Chapter Overview Template	
Content Area: **Science**	
Target Course/Grade Level: **Science Grades 10-12**	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: **5.1 Science Practices:** All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: **A. Understand Scientific Explanations**: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #14.4 SE: 502 *ChemLab* 506 *Launch Lab* 475	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #14.1, #14.4 SE: 478, 502 *ChemLab* 506	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #14.1, #14.4 SE: 478, 502 *ChemLab* 506	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #14.4, #14.4 SE: 478, 502 *ChemLab* 506 *Launch Lab* 475	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #14.1, #14.4 SE: 478, 502 *ChemLab* 506	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #14.4 SE: 502 *ChemLab* 506 *Launch Lab* 475	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #14.1, #14.4 SE: 478, 502 *ChemLab* 506	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #14.4 SE: 502 *ChemLab* 506 *Launch Lab* 475	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #14.4 SE: 502 *ChemLab* 506 *Launch Lab* 475	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 506 *In the Field* 505	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 506	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #14.1, #14.4 SE: 478, 502 *ChemLab* 506 *Launch Lab* 475	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Solids, liquids, and gases may dissolve to form solutions. When combining a solute and solvent to prepare a solution, exceeding a particular concentration of solute will lead to precipitation of the solute from the solution. Dynamic equilibrium occurs in saturated solutions. Concentration of solutions can be calculated in terms of molarity, molality, and percent by mass.	
5.2.12.A.5 Section #14.3 SE: 489-492 *ChemLab* 506 *Launch Lab* 475	Describe the process by which solutes dissolve in solvents.
Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: The driving forces of chemical reactions are energy and entropy. Chemical reactions either release energy to the environment (exothermic) or absorb energy from the environment (endothermic).	
5.2.12.D.2 *Launch Lab* 475	Describe the potential commercial applications of exothermic and endothermic reactions.
Essential Questions: • How are mixtures classified? • How is concentration expressed? • What factors affect the formation of solutions? • What are colligative properties?	

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Chapter Title: Chapter 15 Energy and Chemical Change
Chapter Question: How is energy involved in chemical reactions?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #15.3 SE: 531 *ChemLab* 550 *Launch Lab* 515	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #15.2, #15.3 SE: 526, 531 *ChemLab* 550	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #15.2, #15.3 SE: 526, 531 *ChemLab* 550	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #15.2, #15.3 SE: 526, 531 *ChemLab* 550	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #15.2, #15.3 SE: 526, 531 *ChemLab* 550	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #15.3 SE: 531 *ChemLab* 550	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #15.2, #15.3 SE: 526, 531 *ChemLab* 550	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 *ChemLab* 550 *Launch Lab* 515	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #15.3 SE: 531 *ChemLab* 550	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section #15.3 SE: 531 *Launch Lab* 515	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 550	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #15.2, #15.3 SE: 526, 531 *ChemLab* 550	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #15.2 SE: 526 *ChemLab* 550 *Launch Lab* 515	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 *How It Works* 549	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section #15.3 SE: 531	Account for any trends in the melting points and boiling points of various compounds.
Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
Content Statement: The potential energy of an object on Earth's surface is increased when the object's position is changed from one closer to Earth's surface to one farther from Earth's surface.	
5.2.12.D.1 Section #15.1 SE: 516-517	Model the relationship between the height of an object and its potential energy.

Content Statement: The driving forces of chemical reactions are energy and entropy. Chemical reactions either release energy to the environment (exothermic) or absorb energy from the environment (endothermic).	
5.2.12.D.2 Section #15.2, #15.3 SE: 525-528, 533 *ChemLab* 550 *How It Works* 549 *Launch Lab* 515	Describe the potential commercial applications of exothermic and endothermic reactions.
Essential Questions: • What are the characteristics of energy? • How is the enthalpy change calculated for a chemical reaction? • How are thermochemical equations written? • What is Hess's law? • How can changes in enthalpy and entropy be used to determine whether a reaction is spontaneous?	

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Chapter Title: Chapter 16 Reaction Rates

Chapter Question: How can the rate of a chemical reaction be changed?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584 *Launch Lab* 559	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584 *Launch Lab* 559	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584 *Launch Lab* 559	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584 *Launch Lab* 559	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #16.1, #16.2 SE: 566, 571 *ChemLab* 584 *Launch Lab* 559	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section #16.1 SE: 566 *ChemLab* 584	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 584	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 584 *Launch Lab* 559	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #16.2 SE: 571 *ChemLab* 584 *Launch Lab* 559	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Chemical equilibrium is a dynamic process that is significant in many systems, including biological, ecological, environmental, and geological systems. Chemical reactions occur at different rates. Factors such as temperature, mixing, concentration, particle size, and surface area affect the rates of chemical reactions.	
5.2.12.D.5 Section #16.1, #16.2 SE: 560-566, 568-573 *Chemistry & Health* 583 *ChemLab* 584 *Launch Lab* 559	Model the change in rate of a reaction by changing a factor.

Essential Questions:

- Why are some chemical reactions faster than others?
- What factors affect the rate of a chemical reaction?
- What is the reaction rate law?
- How does the reaction mechanism determine the rate of the overall chemical reaction?

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***Chemistry: Matter and Change* © 2008**
Chapter Title: Chapter 17 Chemical Equilibrium
Chapter Question: What is chemical equilibrium?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #17.2 SE: 611 *ChemLab* 624 *Launch Lab* 593	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #17.3 SE: 622 *ChemLab* 624 *Launch Lab* 593	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 624	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #17.2 SE: 611 *ChemLab* 624	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 624 *Launch Lab* 593	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #17.2, #17.3 SE: 611, 622 *ChemLab* 624 *Launch Lab* 593	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 *ChemLab* 624	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 *ChemLab* 624 *Launch Lab* 593	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #17.3 SE: 622 *ChemLab* 624 *Launch Lab* 593	Use data representations and new models to revise predictions and explanations.

Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *Launch Lab* 593	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *Launch Lab* 593	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #17.2 SE: 611 *ChemLab* 624 *Launch Lab* 593	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Essential Questions: • How is chemical equilibrium described by an equilibrium constant expression? • What happens when changes are made to a system at equilibrium? • How are equilibrium constant expressions used?	

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Chapter Title: Chapter 18 Acids and Bases
Chapter Question: How are acids and bases defined?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #18.2, #18.4 SE: 648, 668 *ChemLab* 670	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #18.2 SE: 648 *ChemLab* 670	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 670	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #18.2, #18.4 SE: 648, 668 *ChemLab* 670 *Launch Lab* 633	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #18.2 SE: 648 *ChemLab* 670	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #18.2, #18.4 SE: 648, 668 *ChemLab* 670 *Everyday Chemistry* 669	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #18.2 SE: 648 *ChemLab* 670	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #18.2, #18.4 SE: 648, 668 *ChemLab* 670	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #18.2 SE: 648 *ChemLab* 670	Use data representations and new models to revise predictions and explanations.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #18.2 SE: 648 *ChemLab* 670 *Launch Lab* 633	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Acids and bases are important in numerous chemical processes that occur around us, from industrial to biological processes, from the laboratory to the environment.	
5.3.12.A.6 Section #18.3, #18.4 SE: 652-658, 660-663, 668 *ChemLab* 670	Relate the pH scale to the concentrations of various acids and bases.
Essential Questions: • What models can be used to describe the behavior of acids and bases? • What determines whether acids and bases are strong or weak? • What are pH and pOH? • What happens in a neutralization reaction?	

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Chapter Title: Chapter 19 Redox Reactions
Chapter Question: What are oxidation-reduction reactions?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #19.2, #19.2 SE: 683, 691 *ChemLab* 698	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 *ChemLab* 698 *Launch Lab* 679	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 698	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #19.1 SE: 683 *ChemLab* 698 *Launch Lab* 679	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 698	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #19.1, #19.2 SE: 683, 691 *ChemLab* 698	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 *ChemLab* 698	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #19.1 SE: 683 *ChemLab* 698	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 *ChemLab* 698	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 698	Consider alternative theories to interpret and evaluate evidence-based arguments.

Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 698	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 698	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #19.1 SE: 683 *ChemLab* 698 *Launch Lab* 679	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section #19.1, #19.2 SE: 680-688, 691 *ChemLab* 698 *Launch Lab* 679	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 *ChemLab* 698 *Launch Lab* 679	Balance chemical equations by applying the law of conservation of mass.
Essential Questions: • How are oxidation and reduction related to each other? • How are redox equations balanced?	

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Chapter Title: Chapter 20 Electrochemistry

Chapter Question: How can chemical energy and electrical energy be interconverted?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #20.2 SE: 726 *ChemLab* 734 *Launch Lab* 707	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 *ChemLab* 734 *Launch Lab* 707	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 734	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #20.2 SE: 726 *ChemLab* 734 *Launch Lab* 707	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 734 *Launch Lab* 707	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #20.2 SE: 726 *ChemLab* 734 *Launch Lab* 707	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #20.2 SE: 724 *ChemLab* 734	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #20.2 SE: 726 *ChemLab* 734 *Launch Lab* 707	Reflect on and revise understandings as new evidence emerges.

Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #20.2 SE: 726 *ChemLab* 734 *Launch Lab* 707	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *Launch Lab* 707	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 734	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #20.2 SE: 726 *ChemLab* 734 *Launch Lab* 707	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section #20.2 SE: 722-727	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
Essential Questions: • What happens in a voltaic cell? • What happens inside a battery? • What is electrolysis?	

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***Chemistry: Matter and Change* © 2008**
Chapter Title: Chapter 21 Hydrocarbons
Chapter Question: How do hydrocarbons differ from one another?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 *ChemLab* 776 *Launch Lab* 743	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 *ChemLab* 776 *Launch Lab* 743	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 776	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #21.3 SE: 763 *ChemLab* 776	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 776 *Launch Lab* 743	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #21.3 SE: 763 *ChemLab* 776 *Launch Lab* 743	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #21.4 SE: 768 *ChemLab* 776	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #21.3 SE: 763 *ChemLab* 776 *Launch Lab* 743	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 *ChemLab* 776 *Launch Lab* 743	Use data representations and new models to revise predictions and explanations.

Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 776 *Launch Lab* 743	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *How It Works* 775	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #21.3 SE: 763 *ChemLab* 776 *Launch Lab* 743	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	
5.2.12.B.3 Section #21.3 SE: 763	Balance chemical equations by applying the law of conservation of mass.
Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section #21.2 SE: 757-758	Account for any trends in the melting points and boiling points of various compounds.

Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: The driving forces of chemical reactions are energy and entropy. Chemical reactions either release energy to the environment (exothermic) or absorb energy from the environment (endothermic).	
5.2.12.D.2 *How It Works* 775	Describe the potential commercial applications of exothermic and endothermic reactions.
Essential Questions: • What are hydrocarbons? • What are alkanes? • What are alkenes and alkynes? • How can some hydrocarbons have the same molecular formulas but different molecular structures? • What are aromatic hydrocarbons?	

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Chapter Title: Chapter 22 Substituted Hydrocarbons and Their Reactions

Chapter Question: What compounds result when different functional groups are substituted for hydrogen atoms in hydrocarbons?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 *ChemLab* 816 *Launch Lab* 785	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 *ChemLab* 816	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 816	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #22.4 SE: 805 *ChemLab* 816 *Launch Lab* 785	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 *ChemLab* 816	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #22.3, #22.4 SE: 800, 805 *ChemLab* 816 *Launch Lab* 785	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #22.4 SE: 805 *ChemLab* 816	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #22.3 SE: 800 *ChemLab* 816 *Launch Lab* 785	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #22.4 SE: 805 *ChemLab* 816	Use data representations and new models to revise predictions and explanations.

Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section #22.3 SE: 800 *ChemLab* 816	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *ChemLab* 816	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 816 *Everyday Chemistry* 815	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #22.3 SE: 800 *ChemLab* 816 *Launch Lab* 785	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond.	
5.2.12.B.2 Section #22.4 SE: 806-807	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.

Strand: C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.	
Content Statement: Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibrational energy of its atoms, molecules, or ions. When the vibrational energy of the molecules of a pure substance becomes great enough, the solid melts.	
5.2.12.C.2 Section #22.1 SE: 789 *ChemLab* 816	Account for any trends in the melting points and boiling points of various compounds.

Essential Questions:

- What compounds result when a halogen atom replaces a hydrogen atom?
- What compounds contain functional groups that include oxygen and nitrogen atoms?
- What are carbonyl compounds?
- How are the chemical reactions of organic compounds classified?
- What are polymers?

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Chapter Title: Chapter 23 The Chemistry of Life

Chapter Question: What are the functions of biological molecules such as proteins, carbohydrates, lipids, and nucleic acids?

Chapter Overview Template	
Content Area: Science	
Target Course/Grade Level: Science Grades 10-12	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #23.4 SE: 842 *ChemLab* 850 *Launch Lab* 825	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #23.4 SE: 842 *ChemLab* 850	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 850 *Launch Lab* 825	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #23.3, #23.4 SE: 837, 842 *ChemLab* 850	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #23.4 SE: 842 *ChemLab* 850	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #23.3, #23.4 SE: 837, 842 *ChemLab* 850 *Launch Lab* 825	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #23.4 SE: 842 *ChemLab* 850 *Launch Lab* 825	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #23.4 SE: 842 *ChemLab* 850 *Launch Lab* 825	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #23.4 SE: 842 *ChemLab* 850	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 *ChemLab* 850	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 Section #23.4 SE: 842 *ChemLab* 850	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 Section #23.3 SE: 837 *ChemLab* 850 *Launch Lab* 825	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Essential Questions: • What are the functions of proteins? • What are the functions of carbohydrates? • What are the functions of lipids? • What are the functions of nucleic acids? • What reactions take place during metabolism?	

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Chapter Title: **Chapter 24 Nuclear Chemistry**

Chapter Question: **What are the applications of nuclear chemistry in our everyday lives?**

Chapter Overview Template	
Content Area: **Science**	
Target Course/Grade Level: **Science Grades 10-12**	
21st Century Themes **Global Awareness** **21st Century Skills** **Creativity and Innovation – Critical Thinking and Problem Solving – Communication and Collaboration – Information Literacy Media Literacy – ICTY Literacy – Life and Career skills**	
Learning Targets	
Standard: **5.1 Science Practices:** All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.	
Strand: **A. Understand Scientific Explanations**: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.	
5.1.12.A.1 Section #24.2, #24.4 SE: 873, 890 *ChemLab* 892 *Launch Lab* 859	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Content Statement: Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.	
5.1.12.A.2 Section #24.2, #24.4 SE: 873, 890 *ChemLab* 892 *Launch Lab* 859	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

Content Statement: Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	
5.1.12.A.3 *ChemLab* 892	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
Strand: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.	
Content Statement: Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.	
5.1.12.B.1 Section #24.4 SE: 890 *ChemLab* 892 *Launch Lab* 859	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
Content Statement: Mathematical tools and technology are used to gather, analyze, and communicate results.	
5.1.12.B.2 Section #24.2, #24.4 SE: 873, 890 *ChemLab* 892 *Launch Lab* 859	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
Content Statement: Empirical evidence is used to construct and defend arguments.	
5.1.12.B.3 Section #24.2 SE: 873 *ChemLab* 892 *Launch Lab* 859	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
Content Statement: Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	
5.1.12.B.4 Section #24.2, #24.4 SE: 873, 890 *ChemLab* 892 *In the Field* 891	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.	
Content Statement: Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	
5.1.12.C.1 Section #24.4 SE: 890 *ChemLab* 892 *Launch Lab* 859	Reflect on and revise understandings as new evidence emerges.
Content Statement: Data and refined models are used to revise predictions and explanations.	
5.1.12.C.2 Section #24.2, #24.4 SE: 873, 890 *ChemLab* 892 *Launch Lab* 859	Use data representations and new models to revise predictions and explanations.
Content Statement: Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	
5.1.12.C.3 Section #24.2 SE: 873 *ChemLab* 892 *Launch Lab* 859	Consider alternative theories to interpret and evaluate evidence-based arguments.
Strand: D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which aresocial practices that are governed by a core set of values and norms.	
Content Statement: Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	
5.1.12.D.1 *Launch Lab* 859	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
Content Statement: Science involves using language, both oral and written, as a tool for making thinking public.	
5.1.12.D.2 *ChemLab* 892	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
Content Statement: Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	
5.1.12.D.3 *ChemLab* 892	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Standard: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.	
Strand: A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.	
CPI #	**Cumulative Progress Indicator (CPI)**
Content Statement: Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.	
5.2.12.A.1 Section #24.1, #24.2, #24.3 SE: 862-863, 865-869, 875-876, 878-880	Use atomic models to predict the behaviors of atoms in interactions.
Content Statement: In a neutral atom, the positively charged nucleus is surrounded by the same number of negatively charged electrons. Atoms of an element whose nuclei have different numbers of neutrons are called isotopes.	
5.2.12.A.4 Section #24.1, #24.2, #24.3, #24.4 SE: 861-864, 865-868, 870-874, 877-884, 886-888 *ChemLab* 892 *In the Field* 891	Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes.
Strand: D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.	
Content Statement: Nuclear reactions (fission and fusion) convert very small amounts of matter into energy.	
5.2.12.D.3 Section #24.3 SE: 877-884	Describe the products and potential applications of fission and fusion reactions.
Essential Questions: • Why do some nuclei emit radiation? • What happens when unstable nuclei break apart spontaneously? • How is energy involved in nuclear fission and fusion? • What are the useful applications and harmful effects of nuclear reactions?	