Kentucky Academic Standards for Science

Unit Title	Estimated Time Frame
Chemical Reactions: Mysterious Substance in Westfield's Water	**23 Days**
Unit Anchor Phenomenon (Big Idea):	
A reddish-brown substance is coming out of the water pipes in the neighborhood of Westfield.	
Problem Students are Trying to Solve (Essential Question):	
Why is there a mysterious reddish-brown substance in the tap water of Westfield?	
Unit Three Dimensional Statement	
To identify a mysterious reddish-brown substance appearing in the pipes of a fictional town, students use digital and physical models and hands-on observations to investigate how atoms are rearranged into different patterns to form new substances during chemical reactions (scale, proportion, and quantity; patterns). Students apply their understanding to construct explanations about how the reddish-brown substance formed as a result of a chemical reaction between the pipes and fertilizer in the water supply.	
Essential Standards (Focal Performance Expectations) (KAS for Science):	
06-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures. **Clarification Statement:** Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms. **Assessment Boundary:** Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete depiction of all individual atoms in a complex molecule or extended structure is not required. KILP: 1 - Recognize that text is anything that communicates a message. 6 - Collaborate with others to create new meaning. 7 - Utilize digital resources to learn and share with others.	

07-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.
Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.
KILP: 6 - Collaborate with others to create new meaning.
8 - Engage in specialized, discipline specific literacy practices.
9 - Apply high level cognitive processes to think deeply and critically about text.

08-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.
Assessment Boundary: Assessment is limited to qualitative information.
KILP: 1 - Recognize that text is anything that communicates a message.
2 - Employ, develop, and refine schema to understand and create text.
5 - Apply strategic practices, with scaffolding and then independently, to approach new literacy tasks.

07-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.
Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.
KILP: 1 - Recognize that text is anything that communicates a message.
6 - Collaborate with others to create new meaning.
7 - Utilize digital resources to learn and share with others.

07-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride.
Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.
KILP: 2 - Employ, develop, and refine schema to understand and create text.
3 - View literacy experiences as transactional, interdisciplinary, and transformational.
8 - Engage in specialized, discipline specific literacy practices.

Supporting Standards (Connections to Other Performance Expectations):

06-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.
Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.

07-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.
Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.

08-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distribution of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).
Assessment Boundary: None provided.

08-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).
Assessment Boundary: None provided.

08-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.
Assessment Boundary: None provided.

Connections to Kentucky Interdisciplinary Literacy Practices (KILP):

1. Recognize that text is anything that communicates a message.
2. Employ, develop and refine schema to understand and create text.
3. View literacy experiences as transactional, interdisciplinary and transformational.
5. Apply strategic practices, with scaffolding and then independently, to approach new literacy tasks.
6. Collaborate with others to create new meaning.
7. Utilize digital resources to learn and share with others.
8. Engage in specialized, discipline specific literacy practices.
9. Apply high level cognitive processes to think deeply and critically about text.

Connections to Standards for Mathematical Practice:
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision.

Science & Engineering Practices Identified in Standards (While only a subset of science and engineering practices are explicitly identified as the mechanism for how students demonstrate mastery at the end of instruction, students should still utilize all of the science and engineering practices as they develop their understanding.) NGSS Appendix F	**Priority Content Disciplinary Core Ideas** NGSS Appendix E	**Crosscutting Concepts Identified in Standards** (While only a subset of crosscutting concepts are explicitly identified as the mechanism for how students demonstrate mastery at the end of instruction, students should still utilize all of the crosscutting concepts as they develop their understanding.) NGSS Appendix G
Developing and Using Models ● Develop a model to predict and/or describe phenomena. ● Develop a model to describe unobservable mechanisms. **Analyzing and Interpreting Data** Analyze and interpret data to determine similarities and differences in findings. **Obtaining, Evaluating, and Communicating Information** Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.	**PS1.A: Structure and Properties of Matter** ● Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. ● Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). ● Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. **PS1.B: Chemical Reactions** ● Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. ● The total number of each type of atom is conserved, and thus the mass does not change. ● Some chemical reactions release energy, others store energy.	**Scale, Proportion, and Quantity** Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. **Patterns** Macroscopic patterns are related to the nature of microscopic and atomic-level structure. **Structure and Function** Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

<u>Constructing Explanations and Designing Solutions</u> Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. ***Connections to Nature of Science*** **<u>Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena</u>** ● Laws are regularities or mathematical descriptions of natural phenomena.	**<u>ETS1.B: Developing Possible Solutions</u>** ● A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (secondary) **<u>ETS1.C: Optimizing the Design Solution</u>** ● Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process - that is, some of the characteristics may be incorporated into the new design. (secondary) ● The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (secondary)	**<u>Energy and Matter</u>** ● Matter is conserved because atoms are conserved in physical and chemical processes. ● The transfer of energy can be tracked as energy flows through a designed or natural system. ***Connections to Engineering, Technology, and Applications of Science*** **<u>Interdependence of Science, Engineering, and Technology</u>** ● Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **<u>Influence of Science, Engineering and Technology on Society and the Natural World</u>** ● The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time.

Prerequisite Skills for Focal Performance Expectations Science & Engineering Practices (from NGSS Appendix F and/or FCPS Enduring Science Skills Document)	**Prerequisite Disciplinary Core Ideas** (from NGSS Appendix E) (Prerequisite Content Knowledge)	**Prerequisite Crosscutting Concepts** **(**from NGSS Appendix G **)**
1. Identify relevant limitations of a model for a proposed object or tool. 2. Develops or revises a model- based on limited evidence–attempts to match a predetermined variable or component of a system if changed. 3. Develops and/or revises a model to attempt to show a relationship between variables. 4. Uses a model of simple systems with uncertain and less predictable factors. 5. Develop a model to describe a mechanism. 6. Develop and/or use a model to generate data to test ideas about phenomena in natural systems. 7. Accurately label columns and rows, and input data in a teacher provided data table template. 8. Use data to consistently identify linear and nonlinear relationships. 9. Interpret data to provide evidence for phenomena. 10. Analyze and interpret data to determine similarities and differences in findings. 11. Uses mean to analyze and characterize data. 12. Construct an explanation of variables including qualitative or quantitative data from valid sources, student's own experiments, or preset data. 13. Construct an explanation and/or prediction for real world phenomenon by using models (student made or previously made).	**PS1.A: Structure and Properties of Matter** ● Matter exists as different substances that have observable different properties. Different properties are suited to different purposes. Objects can be built up from smaller parts. (K-2) ● Matter exists as particles that are too small to see, and so matter is always conserved even if it seems to disappear. Measurements of a variety of observable properties can be used to identify particular materials. (3-5) **PS1.B: Chemical Reactions** ● Heating and cooling substances cause changes that are sometimes reversible and sometimes not. (K-2) ● Chemical reactions that occur when substances are mixed can be identified by the emergence of substances with different properties; the total mass remains the same. (3-5) **ETS1.B: Developing Possible Solutions** ● Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2) ● Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5)	1. Recognize that patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. 2. Identify similarities and differences in order to sort and classify natural objects and designed products. Identify patterns related to time, including simple rates of change and cycles, and to use these patterns to make predictions. 3. Use relative scales (e.g., bigger and smaller; hotter and colder; faster and slower) to describe objects. Use standard units to measure length. 4. Recognize natural objects and observable phenomena exist from the very small to the immensely large. Use standard units to measure and describe physical quantities such as weight, time, temperature, and volume. 5. Objects may break into smaller pieces, be put together into larger pieces, or change shapes. 6. Matter is made of particles and energy can be transferred in various ways and between objects. Observe the conservation of matter by tracking matter flows and cycles before and after processes and recognizing the total weight of substances does not change.

14. Applies scientific ideas or principles to undertake a project engaging in the design cycle, to construct and/or implement a solution. 15. Improves performance of a design by identifying criteria, making tradeoffs, testing, and revising for possible retesting.	**ETS1.C: Optimizing the Design Solution** ● Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2) ● Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (3-5)	

Preconceptions/Misconceptions:

1. A common alternate conception is that the property changes observed during chemical reactions can be ascribed to atoms changing type or to attributes of individual atoms changing. For example, students who observe reactions that form gases or reactions in which a malleable solid is produced from a rigid solid may mistakenly link those changes to atoms becoming larger or softer.

2. Reactions during which matter seems to disappear or appear at the macroscopic scale can perpetuate alternate conceptions some students may have about the conservation of matter. The unit addresses this by acknowledging that, although substances may seem to disappear, the atoms that make up these substances are simply rearranging, likely in the form of different substances that are difficult for us to detect with our senses.

Pedagogical Considerations:

1. To avoid confusion that may arise from the two different (but related) meanings of the word element, this unit uses the phrase type of atom instead of the word element to refer to one of the 118 unique atoms represented on the periodic table.

2. This unit emphasizes that all substances are made of atoms or groups of atoms that repeat to make up substances. Students are intentionally not asked to distinguish between substances made of molecules versus extended structures of ions, since ions and ionic compounds are beyond the scope of this unit. Instead, frequent references are made to substances made of repeating subunits—repeating atoms, or repeating groups of atoms. For example, iron is composed only of iron atoms, so iron is said to be made up of a single repeating iron atom. Conversely, water is composed of a repeating group of two hydrogen atoms and one oxygen atom, joined together as molecules, so water is said to be made up of a repeating group of atoms. This approach allows students to discuss and accurately describe all manner of substances without having to memorize a complicated classification system.

3. Chemical formulas are presented in this unit in order to expose students to this scientific convention, but the interpretation and production of chemical formulas is not expected of students. As such, chemical formulas are always accompanied by a visualization of the repeating group of atoms.

4. In general, mixtures are not a focus of this unit, and differentiating pure substances from mixtures is not a learning goal for students. However, the Chemical Reactions Simulation includes various mixtures, so students may have the opportunity to explore or be exposed to mixtures at the atomic scale. The central key concept students should learn about substances is that they can be distinguished on the basis of both their observable properties and their atomic composition.

5. This unit does not directly list or name chemical properties, although students do observe in the Chemical Reactions Simulation that some specific substances react with other specific substances.

6. This unit does not cover substances dissolving and forming solutions, and it avoids discussion of reactions taking place while substances are dissolved in other substances. In the Chemical Reactions Simulation, however, students can find examples of substances such as sodium chloride dissolving in water.

7. With the exception of the differentiated lesson in Chapter 2, students will not encounter limiting reactants. As a consequence, however, students are sometimes presented with reactants in different amounts without any explanation of why they have more of one substance and less of another. If students find these situations curious or confusing, this can be addressed by explaining that certain chemical reactions require more or less of a given substance in order to occur. Alternatively, you may wish to use this as an opportunity to introduce the idea of a limiting reactant.

Essential Vocabulary:

property	substance	scale	reactant	rearrange
atoms	model	product	chemical reaction	

Assessment Profile:
FCPS 7th Grade Common Unit Assessment Folder **Pre-Unit Assessment (formative) → Lesson 1.1** **Critical Junctures (formative) → Level 2 Progress Build - end of Lesson 2.4** **End of Unit Assessment (Summative) → Lesson 4.4** **Formative Assessments:** On-the-Fly Assessment 1: Analyzing Data for Quality of Evidence (Lesson 1.3, Activity 4) On-the-Fly Assessment 2: Asking Deeper Questions (Lesson 1.4, Activity 2) On-the-Fly Assessment 3: Insight from Student Annotations (Lesson 1.4, Activity 3) On-the-Fly Assessment 4: Using Models at the Atomic Scale to Compare Substances (Lesson 1.6, Activity 3) On-the-Fly Assessment 5: Considering Differences Between Reactants and Products (Lesson 2.1, Activity 4) On-the-Fly Assessment 6: Using Tokens to Show Atomic Rearrangement (Lesson 2.2, Activity 3) On-the-Fly Assessment 7: Constructing a Model of How the Rust Formed (Lesson 2.3, Activity 3) On-the-Fly Assessment 8: Progress with Asking Deeper Questions (Lesson 3.1, Activity 3) On-the-Fly Assessment 9: Insight from Student Annotations (Lesson 3.1, Activity 4) On-the-Fly Assessment 10: Explaining What Happens When Substances Burn (Lesson 3.2, Activity 4) On-the-Fly Assessment 11: Using Vocabulary to Explain Why Atoms Seem to Appear (Lesson 3.3, Activity 3) On-the-Fly Assessment 12: Evaluating How Models Represent the Atomic Scale (Lesson 3.4, Activity 2) On-the-Fly Assessment 13: Coordinating Evidence to Support Claims (Lesson 4.2, Activity 3) On-the-Fly Assessment 14: Using Evidence to Make Clear Arguments About Chemical Reactions (Lesson 4.3, Activity 3)
Other High Quality Resources
Next Generation Science Standards - Quality Examples of Science Lessons and Units Open SciEd Classroom Resources
FCPS Resources
FCPS Achievement & Trauma-Informed Strategies in the Classroom

Individual lesson information to be completed at the school level based on pre-unit assessment data and formative assessment data.

Chapter 1 Problem Students are Trying to Solve: (Supporting Question)				
What is the reddish-brown substance in the water?				
Chapter 1 Three Dimensional Statement:				
Students begin to investigate a mysterious reddish-brown substance discovered coming out of the water pipes in a fictional community. They first observe substances at the macroscale and then use the digital model (a simulation) to observe substances at the atomic scale to figure out that observable differences between different substances are the result of differences at the atomic scale (scale, proportion, and quantity).				
		Anchor Resource Connections		
Lesson Learning Intention (describes clearly what the students will know and/or be able to do as a result of learning and teaching.)	**Lesson Success Criteria** (based on lesson sequence and connections to Learning Intention)	**Learning Progression** (from "Evidence sources and reflection opportunities" AND "Application of key concepts to problem" on the Coherence Flowchart)	**Key Concepts** (from Key Concepts section on the Coherence Flowchart)	**Amplify Progress Build Level** (these are found in Planning for the Unit on the Unit Landing Page in Progress Build)
The Pre-Unit Assessment is diagnostic and designed to reveal students' understanding of the unit's core content, both unit-specific science concepts and crosscutting concepts, prior to instruction by indicating, for formative purposes, where students initially fall along the levels of the Progress Build (PB). The Pre-Unit Assessment also measures students' understanding of important supporting content not explicitly included in the PB. As such, it offers a baseline from which to measure growth of understanding over the course of the unit.				
I am learning to observe and record properties of substances so that I can explain how properties can be different for different substances and that not all properties can be observed on a macroscale.	I know I am successful when I can: ● discuss why it is important to have access to clean water at home. ● make observations of substances to gather and evaluate evidence for a claim. ● define property ● identify properties not observed in the macroscale.	● Observe different substances to gather evidence about the identity of the reddish-brown substance (1.2)		**Progress Build Level 1: Different substances have different properties. This is because every substance is made of a unique group of a certain type and number of atoms. This group repeats to make up the substance.** Different substances have different sets of properties that can be observed, such as color, smell, texture, phase, and boiling point, all of which can be compared to determine if substances are different. All substances are made of atoms in

				groups that repeat to form the substance. Differences in the type and number of atoms of repeating groups distinguish substances from one another.
I am learning to collect evidence in the form of properties from different substances so that I can make a claim about the substances in question. .	I know I am successful when I can: ● explain Evidence Criterion. ● observe, discuss, and record in order to investigate the properties of four unknown substances. ● make a prediction based on evidence about the unknown substances. ● use the Evidence Criterion to sort observations based on their quality and how they might be used as evidence.	● Make detailed observations of four samples to predict whether or not any of them are the same substance (1.3)	● Different substances have different properties. (1.3)	**Progress Build Level 1: Different substances have different properties. This is because every substance is made of a unique group of a certain type and number of atoms. This group repeats to make up the substance.**
I am learning to ask questions and acquire information from text so that I can explain how atomic structure can affect properties.	I know I am successful when I can: ● explain the phrase "Everything is Made of Atoms " ● use Active Reading to develop questions from reading a text. ● define scale ● define atoms and substance. ● Share and discuss annotations to develop additional questions. ● explain how atomic	● Watch a video to visualize the atoms that make up everything (1.4) ● Read "*Atomic Zoom-In*" (1.4)		**Progress Build Level 1: Different substances have different properties. This is because every substance is made of a unique group of a certain type and number of atoms. This group repeats to make up the substance.**

	structure can affect properties.			
I am learning to use a model to investigate substance properties at the atomic scale so that I can determine the effect of atom arrangement on macroscale properties.	I know I am successful when I can: ● use an atomic-scale model to look at known substances. ● use a model to determine if samples represented are the same or different substances. ● use a modeling tool to model substances at the atomic scale.	● Use the Sim to investigate the properties of substances and relate the properties to atomic-scale models of the substances (1.5) ● Revisit "Atomic Zoom-In" (1.5)	● Things that are too small (or too large) to see can be studied with models. (1.5)	**Progress Build Level 1: Different substances have different properties. This is because every substance is made of a unique group of a certain type and number of atoms. This group repeats to make up the substance.**
I am learning to analyze and interpret evidence about the atomic structure of a substance so that I can use this evidence to construct a written explanation about whether one substance is the same as or different from other substances.	I know I am successful when I can: ● communicate why substances have different properties. ● describe the atomic structure of the pipe, fertilizer and reddish-brown substance.	● Use unit vocabulary to answer the investigation question. (1.6) ● Write an argument about whether the reddish-brown substance is the same as the substance that makes up the pipes, the same as the fertilizer, or a different substance (1.6)	● Substances have different properties because they are made of different groups of atoms. These groups vary in the type or number of atoms that make up the group. (1.6) ● Groups of atoms repeat to make up a substance.(1.6)	**Progress Build Level 1: Different substances have different properties. This is because every substance is made of a unique group of a certain type and number of atoms. This group repeats to make up the substance.**

Other High Quality Resources
[Next Generation Science Standards - Quality Examples of Science Lessons and Units] [Open SciEd Classroom Resources]
FCPS Resources
[FCPS Achievement & Trauma-Informed Strategies in the Classroom]

Individual lesson information to be completed at the school level based on pre-unit assessment data and formative assessment data.

Chapter 2 Problem Students are Trying to Solve: (Supporting Question)				
How did the rust form?				
Chapter 2 Three Dimensional Statement:				
In order to construct explanations about how the rust in Westfield's water formed, students gather evidence from hands-on activities, a physical model, and the digital simulation to investigate whether or not it is possible for substances to change into different substances (scale proportion, and quantity; cause and effect). Then students construct visual models of how atoms are rearranged during a chemical reaction (patterns).				
		Anchor Resource Connections		
Lesson Learning Intention (describes clearly what the students will know and/or be able to do as a result of learning and teaching.)	**Lesson Success Criteria** (based on lesson sequence and connections to Learning Intention)	**Learning Progression** (from "Evidence sources and reflection opportunities" AND "Application of key concepts to problem" on the Coherence Flowchart)	**Key Concepts** (from Key Concepts section on the Coherence Flowchart)	**Amplify Progress Build Level** (these are found in Planning for the Unit on the Unit Landing Page in Progress Build)
I am learning to….. so that I can….	I know I am successful when I can: •			
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Individual lesson information to be completed at the school level based on pre-unit assessment data and formative assessment data.

Chapter 3 Problem Students are Trying to Solve: (Supporting Question)
What was produced during the reaction between the iron pipes and the fertilizer?
Chapter 3 Three Dimensional Statement:
Students investigate how atoms are neither created nor destroyed during a chemical reaction (scale proportion, and quantity; patterns). First they obtain information from an article and the digital model about what happens to fuels as they burn. Next, students construct visual models and write explanations about how the atoms in the pipes and in the fertilizer were rearranged into different patterns to form rust and another product.

		Anchor Resource Connections		
Lesson Learning Intention (describes clearly what the students will know and/or be able to do as a result of learning and teaching.)	**Lesson Success Criteria** (based on lesson sequence and connections to Learning Intention)	**Learning Progression** (from "Evidence sources and reflection opportunities" AND "Application of key concepts to problem" on the Coherence Flowchart)	**Key Concepts** (from Key Concepts section on the Coherence Flowchart)	**Amplify Progress Build Level** (these are found in Planning for the Unit on the Unit Landing Page in Progress Build)
I am learning to….. so that I can….	I know I am successful when I can: •			
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I am learning to….. so that I can….	I know I am successful when I can: •			

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Chapter 4 Problem Students are Trying to Solve: (Supporting Question)				
Who might have used the unknown substance to steal the diamond?				
Chapter 4 Three Dimensional Statement:				
Students analyze evidence and make oral and written arguments—using what they have figured out about substances at the macroscale and atomic scale and about how atoms rearrange during a chemical reaction (scale, proportion, and quantity; patterns)—to create models that distinguish between suspects who could and could not have made hydrofluoric acid.				
		Anchor Resource Connections		
Lesson Learning Intention (describes clearly what the students will know and/or be able to do as a result of learning and teaching.)	**Lesson Success Criteria** (based on lesson sequence and connections to Learning Intention)	**Learning Progression** (from "Evidence sources and reflection opportunities" AND "Application of key concepts to problem" on the Coherence Flowchart)	**Key Concepts** (from Key Concepts section on the Coherence Flowchart)	**Amplify Progress Build Level** (these are found in Planning for the Unit on the Unit Landing Page in Progress Build)
I am learning to….. so that I can….	I know I am successful when I can: •			
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