

# Chemistry 5<sup>th</sup> Edition

## Lesson Plan Overview

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 1: FOUNDATIONS OF CHEMISTRY (7 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
1.1 Chemistry: Modeling Matter	1–4	1–4	Mini Lab: <i>Seeing Is Believing?</i> (p. 5)	EQ: What is chemistry? <b>Objectives:</b> 1.1.1 Define <i>chemistry</i> . 1.1.2 Explain the role of modeling in chemistry. 1.1.3 Evaluate the statement, “Scientific models reveal what is true about the world.” 1.1.4 Describe how a scientist’s worldview affects his work.
Lab Day 1	SLM* 1–4	TLM** 1–4	Lab 1A: <i>The Great Biscuit Bake-Off</i> —Relating the Composition and Properties of Biscuits	EQ: How do changes to the ratio of ingredients in a biscuit affect its properties?
1.2 Chemistry Helps People	6–10	6–10	Ethics: Christian Ethics and Chemistry Case Study: The Cost of Vaccine Research	EQ: Why is chemistry important? <b>Objectives:</b> 1.2.1 Compare how naturalists and Christians view chemistry. 1.2.2 Explain a chemist’s obligation to others and the environment. 1.2.3 Summarize how worldview relates to chemistry. 1.2.4 Summarize the process for making ethical decisions on the basis of biblical principles, outcomes, and motivations.
1.3 Doing Chemistry	10–16	10–17	Ethics: Pesticides Case Study: Quinine in Time	EQ: How do chemists solve problems? <b>Objectives:</b> 1.3.1 Compare the terms <i>hypothesis</i> , <i>theory</i> , and <i>law</i> . 1.3.2 Describe the process of scientific inquiry. 1.3.3 Create a scientific question that could be best answered through scientific inquiry. 1.3.4 Analyze a case study of scientific inquiry.
Lab Day 2	SLM 5–8	TLM 5–8	Lab 1B: <i>The Safety Saga</i> —Thinking Safe in the Laboratory	EQ: How can I prevent accidents and injuries in the laboratory?
<b>Review and Test Days</b>			Chapter 1 Test	
* SLM = Student Lab Manual **TLM = Teacher Lab Manual				

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 2: MATTER (6 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
2.1 The Classification of Matter	21–30	21–31	Case Study: Understanding Trihydrogen Demonstrating Reactivity Mini Lab: <i>Paper Chromatography</i>	EQ: Isn't all matter the same? <b>Objectives:</b> 2.1.1 Evaluate differing views about the origin of matter. 2.1.2 Compare physical and chemical properties. 2.1.3 Define <i>pure substance</i> and <i>mixture</i> . 2.1.4 Organize matter into general categories on the basis of characteristics. 2.1.5 Explain where chemical symbols came from. 2.1.6 Interpret chemical formulas.
Lab Day 1	SLM 9–14	TLM 9–14	Lab 2A: <i>Needle in a Haystack</i> —Separating Mixtures	EQ: How can I separate a mixture even when the components are similar?
Lab Day 2	SLM 15–18	TLM 15–18	Lab 2B: <i>Zebroids, Wolphins, and Ligers, Oh My!</i> —Classifying Matter	EQ: Does physically or chemically combining elements change their properties?
2.2 Energy and Matter	31–39	31–39	Worldview Investigation: The Big Bang Demonstrating Entropy Physically, Demonstrating Entropy in Solutions, Demonstrating Thermal Energy and Temperature	EQ: How can energy be lost? <b>Objectives:</b> 2.2.1 List and give examples of the six common forms of energy. 2.2.2 State the three laws of thermodynamics in your own words. 2.2.3 Explain how the origin of energy fits in with the laws of thermodynamics. 2.2.4 Compare temperature, thermal energy, and heat. 2.2.5 Explain exothermic and endothermic processes and give an example of each. 2.2.6 Explain why the Kelvin scale is called the absolute temperature scale.
2.3 The States of Matter	40–44	40–44	Demonstrating States, Demonstrating a Phase Change Careers: Serving as a Materials Scientist	EQ: Why do ice cubes in the freezer disappear? <b>Objectives:</b> 2.3.1 Summarize the kinetic-molecular theory of matter. 2.3.2 Compare the states of matter on the basis of their physical properties. 2.3.3 Summarize changes in state as energy moves into or out of a substance. 2.3.4 Relate changes of state and the temperature points where these changes occur.
<b>Review and Test Days</b>			Chapter 2 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 3: MEASUREMENTS IN CHEMISTRY (7 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
3.1 Measurement Systems	49–57	48–57	Case Study: Redefining the Kilogram How It Works: Speedometer	EQ: Why do I need to learn the metric system? <b>Objectives:</b> <b>3.1.1</b> Explain why we need a measurement system. <b>3.1.2</b> List the fundamental units of the SI, including their symbols and the quantities they measure. <b>3.1.3</b> Differentiate between fundamental and derived units in the SI. <b>3.1.4</b> Explain the benefits of using the SI. <b>3.1.5</b> Convert between metric units.
Lab Day 1	SLM 19–22	TLM 19–22	Lab 3A: <i>Metric Unicorns</i> — Exploring the Metric System	EQ: How are rulers made?
3.2 Measurements	58–64	58–64	Mini Lab: <i>Accuracy and Precision</i> Demonstrating Precise Rulers	EQ: Is being accurate and precise the same thing? <b>Objectives:</b> <b>3.2.1</b> Evaluate the statement, “I can know the measurement of an object.” <b>3.2.2</b> Explain why accuracy and precision are important. <b>3.2.3</b> Describe the factors that affect precision in measurements. <b>3.2.4</b> Evaluate the accuracy and precision of measurements. <b>3.2.5</b> Explain the role of significant figures in measurement.
Lab Day 2	SLM 23–24	TLM 23–24D	Lab 3B: <i>You Are My Density</i> — Inquiring into Measurement	EQ: How do different methods affect the accuracy of experimental methods?
3.3 Problem Solving in Chemistry	65–70	65–70	Careers: Serving as a Climatologist: Weather Watchers Ethics: Ethical Medical Testing (p. 74)	EQ: How do I solve problems in chemistry? <b>Objectives:</b> <b>3.3.1</b> Explain the rules for significant figures in mathematical operations. <b>3.3.2</b> Apply the rules for significant figures for maintaining precision during mathematical operations. <b>3.3.3</b> Explain why orderly problem solving is important in chemistry. <b>3.3.4</b> Summarize the process of problem solving. <b>3.3.5</b> Solve problems involving measurements and mathematical operations. <b>3.3.6</b> Explain why you should check the reasonableness of your answers. <b>3.3.7</b> Describe a strategy that applies biblical principles to an ethical issue.
<b>Review and Test Days</b>			Chapter 3 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 4: ATOMIC STRUCTURE (7 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
4.1 Early Thoughts about Matter	77–79	77–79		EQ: How has our understanding of matter changed through history? <b>Objectives:</b> 4.1.1 Compare atomism and the continuous theory of matter. 4.1.2 State the laws of definite proportion and multiple proportions. 4.1.3 Summarize the scientific evidence that led to the acceptance of atomism.
4.2 The Development of Atomic Models	80–84	80–85	Web Link: Cathode Ray Tube Mini Lab: <i>Indirect Observation</i>	EQ: What are atoms made of? <b>Objectives:</b> 4.2.1 Summarize the discoveries that led to changes in the atomic model. 4.2.2 Explain how changes to the atomic model made the model more workable. 4.2.3 Sketch each of the historical atomic models. 4.2.4 Summarize the three major subatomic particles, including mass, charge, and location.
4.3 Useful Notations	85–89	85–89	Careers: Serving as a Science Teacher	EQ: Are all carbon atoms the same? <b>Objectives:</b> 4.3.1 Determine the number of protons, neutrons, and electrons in an atom of an isotope when given the isotope’s name or notation. 4.3.2 Compare mass number and atomic mass. 4.3.3 Calculate the atomic mass of an element when given the relative abundance of its natural isotopes.
Lab Day	SLM 25–31	TLM 25–31	Lab 4: <i>All That Glitters Is Not Copper-63</i> —Mixtures of Isotopes	EQ: Why are the masses on the periodic table not whole numbers?
Ethics Day	93	93	Radium Girls	<b>Objective:</b> 4.3.4 Evaluate the practice of withholding information about risks.
<b>Review and Test Days</b>			Chapter 4 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 5: ELECTRON ARRANGEMENT (7 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
5.1 Bohr Model	95–99	95–99	Worldview Investigation: Exoplanets How It Works: Spectroscopy Mini Lab: <i>Lights, Spectroscope, Action!</i>	EQ: Why are fireworks different colors? <b>Objectives:</b> 5.1.1 Explain the significance of emission spectra to the development of the atomic model. 5.1.2 Describe the Bohr model and how it explained the spectral lines for hydrogen. 5.1.3 Explain the limitations of the Bohr model that led scientists to replace it.
Lab Day 1	SLM 33–35	TLM 33–35	Lab 5A: <i>Bullseye!</i> —Modeling an Atomic Orbital	EQ: Why can't we know exactly where electrons are located?
Lab Day 2	SLM 37–44	TLM 37–44	Lab 5B: <i>Seeing Light in a New Way</i> —Exploring Spectroscopy	EQ: How can light be used to identify elements?
5.2 Quantum-Mechanical Model	100–105	100–105	Demonstrating the Heisenberg Uncertainty Principle, Demonstrating <i>p</i> Orbitals	EQ: Where are the electrons in atoms? <b>Objectives:</b> 5.2.1 Explain the impact of the discovery of the wave-particle duality of matter on the way that scientists view the universe. 5.2.2 Describe the quantum-mechanical model of the atom. 5.2.3 Formulate a biblical view of scientific knowledge.
5.3 Electron Configurations	106–12	106–12		EQ: Why does it matter how electrons are arranged? <b>Objectives:</b> 5.3.1 Depict the electron configuration, orbital notation, or noble gas notation of an atom. 5.3.2 Summarize the aufbau principle, Hund's rule, and the Pauli exclusion principle. 5.3.3 Identify valence electrons in an atom on the basis of its electron configuration, orbital notation, or noble gas notation. 5.3.4 Analyze electron configuration, orbital notation, or noble gas notation for errors.
<b>Review and Test Days</b>			Chapter 5 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 6: PERIODIC TABLE AND ELEMENTS (9 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
6.1 The Periodic Table	117–26	117–26	Worldview Investigation: Element Origins	EQ: Why does the periodic table look the way it does? <b>Objectives:</b> 6.1.1 Describe the development of the modern periodic table. 6.1.2 Describe the information on the periodic table, including cell data, periods, and groups. 6.1.3 Identify the regions of the periodic table occupied by metals, nonmetals, and metalloids. 6.1.4 Explain how the shape and arrangement of the periodic table are related to the structure of atoms.
Lab Day 1	SLM 45–46	TLM 45–46D	Lab 6A: <i>Exposed to the Elements</i> —Inquiring into Properties of Elements	EQ: How do we classify elements?
6.2 Periodic Trends	127–32	127–32	Case Study: What’s in a Name?	EQ: What does fluorine’s position on the periodic table tell us? <b>Objectives:</b> 6.2.1 Describe the periodic trends in atomic radii, first ionization energy, and electronegativity. 6.2.2 Explain why atomic radii, ionic radii, first ionization energy, and electronegativity vary as they do across periods and down families. 6.2.3 Compare the relative magnitude of each periodic trend for two or more elements using a periodic table. 6.2.4 Assess the ability of the periodic table to make predictions.
Lab Day 2	SLM 47–52	TLM 47–52	Lab 6B: <i>An Elemental Merry-Go-Round</i> —Exploring Periodic Trends	EQ: What does the periodic table tell us about chemical and physical properties?
6.3 Elements by Their Groups (2 days)	133–47	133–47	Demonstrating Metal Scum, Demonstrating the Disappearance of Copper, Demonstrating Oxygen and Combustible Beef How It Works: Hydrogen Fuel Cell Careers: Serving as a Chemical Engineer Web Link: Facts about Astatine Mini Lab: <i>Dense, Denser, Densest?</i>	EQ: What do the elements in a group have in common? <b>Objectives:</b> 6.3.1 Name the groups and series that are included in the periodic table. 6.3.2 Explain why elements are in particular groups. 6.3.3 Describe the general physical and chemical properties of each group or series. 6.3.4 Predict physical and chemical properties of elements on the basis of their locations in the periodic table.
Ethics Day	151	151	Rare-Earth Elements and Risks	<b>Objective:</b> 6.3.5 Evaluate the practice of recovering rare earth metals from hazardous waste.

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
Review and Test Days			Chapter 6 Test	
<b>CHAPTER 7: CHEMICAL BONDS (10 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
7.1 Bonding Basics	153–57	153–57		<p>EQ: How do different atoms form bonds?</p> <p><b>Objectives:</b></p> <p><b>7.1.1</b> Explain why atoms bond.</p> <p><b>7.1.2</b> Compare covalent, ionic, and metallic bonds.</p> <p><b>7.1.3</b> Explain the relationship between electron location and polarity in polar covalent bonds.</p> <p><b>7.1.4</b> Predict the type of bond that will form between two atoms when given their location on the periodic table.</p>
7.2 Types of Bonds (2 days)	158–66	158–67	Web Link: Covalent Bonding Demonstrating Making an Ionic Crystal	<p>EQ: What determines the bond type that forms between two atoms?</p> <p><b>Objectives:</b></p> <p><b>7.2.1</b> Describe how atoms form covalent bonds.</p> <p><b>7.2.2</b> Name the elements that exist as diatomic molecules.</p> <p><b>7.2.3</b> Draw Lewis structures of covalent compounds and polyatomic ions when given their names or chemical formulas.</p> <p><b>7.2.4</b> Describe the general arrangement of bonded electrons for each type of bond.</p> <p><b>7.2.5</b> Differentiate between a formula unit and a molecule.</p> <p><b>7.2.6</b> Summarize the current model of metallic bonding.</p>
Lab Day 1	SLM 53–57	TLM 53–57	Lab 7A: <i>The Name's Bond—Covalent Bond</i> —Modeling Covalent Bonds	EQ: Can physical models accurately represent what happens when atoms make covalent bonds?
7.3 Properties of Compounds	167–70	167–70	Worldview Investigation: Biodegradable Plastic Mini Lab: <i>Pie Pan Predictions</i>	<p>EQ: How do compounds with different bond types behave differently?</p> <p><b>Objectives:</b></p> <p><b>7.3.1</b> Describe the general properties of compounds according to their predominant bond type.</p> <p><b>7.3.2</b> Explain how the mobility of electrons affects how compounds conduct electricity and heat.</p> <p><b>7.3.3</b> Explain how the intermolecular forces between a compound's particles affect the melting point of the compound.</p>
Lab Day 2 (2 days)	SLM 59–63	TLM 59–63	Lab 7B: <i>Bulletproof Chemistry—Relating Chemical Bonds and Physical Properties</i>	EQ: How can we use physical properties to identify bond types in substances?
Ethics Day	173	173, 173A	Plastic—Wonder Product or Destroyer of Worlds?	<p><b>Objective:</b></p> <p><b>7.3.4</b> Evaluate the use of plastics.</p>

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Review and Test Days			Chapter 7 Test	
<b>CHAPTER 8: BOND THEORIES AND MOLECULAR GEOMETRY (8 DAYS)</b> <b>KEY CHAPTER</b>				
8.1 Bond Theories	175–81	175–81	Careers: Serving as a Patent Attorney	EQ: Where are the electrons in a chemical bond? <b>Objectives:</b> 8.1.1 Evaluate the workability of Lewis structures. 8.1.2 Discuss the key features and limitations of the valence bond and molecular orbital theories. 8.1.3 Describe the formation of sigma and pi bonds. 8.1.4 Describe exceptions to valence bond theory.
Lab Day 1	SLM 65–70	TLM 65–70	Lab 8A: <i>The Shape of Things—Modeling Molecules</i>	EQ: What determines the shape of a molecule?
8.2 Molecular Geometry (2 days)	182–92	182–92	Worldview Investigation: Refreshing Water Demonstrating the Polarity of Water How It Works: Water Striders Mini Lab: <i>A Pile of Water</i>	EQ: Why does the shape of a molecule matter? <b>Objectives:</b> 8.2.1 Define <i>VSEPR theory</i> . 8.2.2 Predict and name a molecule's general shape and bond angle when given its Lewis structure. 8.2.3 Draw electron configurations representing orbital hybridization. 8.2.4 Predict the existence and direction of a dipole moment in a molecule when given its Lewis structure. 8.2.5 Explain how the shape and structure of water confirm the Bible's teaching about God's care for creation.
Lab Day 2	SLM 71–77	TLM 71–77	Lab 8B: <i>Change of Address—Investigating Molecular Orbitals</i>	EQ: How does the molecular orbital theory relate to orbital notation for atoms?
Ethics Day	195	195, 195A	The Law of the River	<b>Objective:</b> 8.2.6 Formulate a position on the proper use of natural resources to meet the needs of people.
Review and Test Days			Chapter 8 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 9: CHEMICAL COMPOUNDS (8 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
9.1 Ionic Compounds (2 days)	197–209	197–209	Worldview Investigation: IUPAC Careers: Serving as an Anesthesiologist	EQ: How do I write formulas for and name ionic compounds? <b>Objectives:</b> 9.1.1 Write formulas for ionic compounds when given the elements of which they are made. 9.1.2 Name ionic compounds when given their formulas. 9.1.3 Write formulas for ionic compounds when given their names. 9.1.4 Explain the significance of the roman numerals in some ionic compounds.
Lab Day	SLM 79–85	TLM 79–85	Lab 9: <i>Compounds Scavenger Hunt</i> —Naming Chemical Compounds	EQ: How do I name chemical compounds?
9.2 Covalent Compounds	210–12	210–12	Mini Lab: <i>Same Stuff, Different Name?</i>	EQ: How are the names of covalent compounds different from those for ionic compounds? <b>Objectives:</b> 9.2.1 Explain why scientists use a prefix system for naming covalent compounds. 9.2.2 Name covalent compounds on the basis of their formulas. 9.2.3 Write formulas for covalent compounds on the basis of their names.
9.3 Acids	213–14	213–14		EQ: Why is naming acids so complex? <b>Objectives:</b> 9.3.1 Compare binary and ternary acids. 9.3.2 Name acids on the basis of their formulas. 9.3.3 Write formulas for acids on the basis of their names.
Ethics Day	217	217, 217A	Drug Testing	<b>Objective:</b> 9.3.4 Justify the use of drug testing.
<b>Review and Test Days</b>			Chapter 9 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 10: CHEMICAL REACTIONS AND EQUATIONS (10 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
10.1 Chemical Equations (2 days)	219–27	219–27	Case Study: Waste Not, Want Not Demonstrating the Reaction between Zinc and Hydrochloric Acid, Demonstrating the Effect of a Catalyst: Elephant Toothpaste Web Links: Beautiful Chemistry, Balancing Chemical Equations Mini Lab: <i>Conserving Atoms</i>	EQ: What do chemical equations do for us? <b>Objectives:</b> <b>10.1.1</b> Describe the changes that occur at the atomic level during a chemical reaction. <b>10.1.2</b> Recognize observable macroscopic indicators of chemical changes. <b>10.1.3</b> Explain the process for balancing a chemical equation. <b>10.1.4</b> Write a balanced chemical equation for a chemical reaction when given its word equation. <b>10.1.5</b> Describe the benefits and limitations of chemical equations for modeling chemical reactions.
Lab Day 1	SLM 87–90	TLM 87–90	Lab 10A: <i>Expeditions in Chemical Equations</i> —Investigating Chemical Reactions and Equations	EQ: How can I tell whether a chemical reaction has occurred?
10.2 Types of Reactions (2 days)	228–36	228–36	Demonstrating a Synthesis Reaction: Rust Is in the Air, Demonstrating the Decomposition of Sugar, Demonstrating a Single-Replacement Reaction How It Works: Dynamite Careers: Serving as an Explosive Ordnance Disposal (EOD) Technician Web Links: Sugar Snake, Ammonium Dichromate Decomposition, Whoosh Bottle Demonstration, Single-Replacement Reaction	EQ: Are all chemical reactions the same? <b>Objectives:</b> <b>10.2.1</b> Describe the distinguishing feature of synthesis, decomposition, combustion, single-replacement, and double-replacement reactions. <b>10.2.2</b> Classify a reaction as a synthesis, decomposition, combustion, single-replacement, or double-replacement reaction. <b>10.2.3</b> Predict whether a single-replacement or double-replacement reaction will occur. <b>10.2.4</b> Analyze equations for double-replacement reactions to write complete ionic and net ionic equations.
Lab Day 2 (2 days)	SLM 91–93	TLM 91–93C	Lab 10B: <i>With a Chance of Precipitation</i> —Inquiring into Solubility	EQ: How can we generate solubility rules for ionic compounds?
Ethics Day	239	239, 239A	Explosives Development	<b>Objective:</b> <b>10.2.5</b> Respond to the statement, “Research in explosives technology is wrong.”
<b>Review and Test Days</b>			Chapter 10 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 11: CHEMICAL CALCULATIONS (9 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
11.1 The Mole	241–51	241–51	Demonstrating the Mole, Demonstrating the Percent Composition of Water  How It Works: Carbon Monoxide Detector	EQ: How do we count atoms if we can't see them? <b>Objectives:</b> <b>11.1.1</b> Define <i>mole</i> . <b>11.1.2</b> Describe the significance of Avogadro's number. <b>11.1.3</b> Convert between the mass, number of particles, or number of moles present in a sample of a given chemical substance. <b>11.1.4</b> Distinguish between structural, molecular, and empirical formulas. <b>11.1.5</b> Calculate the percent composition of a substance when given the mass of each of its elements. <b>11.1.6</b> Calculate an empirical formula from the percent composition of a substance.
Lab Day 1	SLM 95–100	TLM 95–100	Lab 11A: <i>Torching Metals</i> —Empirical Formulas	EQ: How can burning a substance make it heavier?
11.2 Stoichiometry (2 days)	252–58	252–58	Careers: Serving as a Chemical Abatement Specialist  Mini Lab: <i>Blowup</i>	EQ: How do I know how much reactant to use? <b>Objectives:</b> <b>11.2.1</b> Outline the process for performing stoichiometric calculations. <b>11.2.2</b> Predict the theoretical quantities of chemical substances involved in chemical reactions.
Lab Day 2	SLM 101–5	TLM 101–5	Lab 11B: <i>Chymestry</i> —Using Stoichiometric Relationships	EQ: What chemistry takes place in my small intestine?
11.3 Real-World Stoichiometry	259–62	259–62	Case Study: Sulfuric Acid Demonstrating Percent Yield  Web Links: Reactants, Products, and Leftovers; Limiting Reactant	EQ: Why can't we actually obtain a theoretical yield? <b>Objectives:</b> <b>11.3.1</b> Identify the limiting and excess reactants in a chemical reaction when given the quantities of the reactants. <b>11.3.2</b> Calculate the amount of excess reactant in a chemical reaction when given the quantities of the reactants. <b>11.3.3</b> Calculate the percent yield when given the actual yield from a chemical reaction. <b>11.3.4</b> Defend the use of stoichiometry even though we can never obtain the theoretical yield.
Ethics Day	267	266, 267	Mandatory Detectors	<b>Objective:</b> <b>11.3.5</b> Respond to the statement, "Homeowners have an obligation to install carbon monoxide detectors."
<b>Review and Test Days</b>			Chapter 11 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 12: GASES (9 DAYS)</b> <b>KEY CHAPTER</b>				
12.1 Properties of Gases	269–73	269–73	Demonstrating the Diffusion and Reaction of Gases, Demonstrating Pressure	<b>EQ: Why do gases behave as they do?</b> <b>Objectives:</b> <b>12.1.1</b> State the kinetic-molecular theory of gases. <b>12.1.2</b> Convert measurements between different units of pressure. <b>12.1.3</b> Relate the pressure, volume, and temperature of gases to the kinetic-molecular theory.
12.2 Gas Laws	274–82	274–82	Case Study: When Oxygen Is Bad Demonstrating Boyle’s Law #1, Demonstrating Boyle’s Law #2, Demonstrating Charles’s Law  Web Links: Boyle’s Law, Charles’s Law, Gay-Lussac’s Law  Mini Lab: <i>Changing Volume</i>	<b>EQ: Why do balloons stop getting bigger?</b> <b>Objectives:</b> <b>12.2.1</b> State Boyle’s, Charles’s, Gay-Lussac’s, and the combined gas laws qualitatively and mathematically. <b>12.2.2</b> Calculate the pressure, volume, or temperature of a gas under changing conditions. <b>12.2.3</b> Use the kinetic-molecular theory of gases to explain the gas laws. <b>12.2.4</b> Calculate the amount of gas produced from a solution by applying Dalton’s law of partial pressures.
Lab Day 1	SLM* 107–10	TLM** 107–10	Lab 12A: <i>Cold and Calculating—Finding Absolute Zero</i>	<b>EQ: How can we determine an impossibly cold temperature?</b>
12.3 Gas Stoichiometry (2 days)	283–93	283–93	How It Works: Airbags Worldview Investigation: Greenhouse Gases	<b>EQ: How do gases actually behave?</b> <b>Objectives:</b> <b>12.3.1</b> State the law of combining volumes. <b>12.3.2</b> Explain why the kinetic-molecular theory is limited in its ability to describe real gases. <b>12.3.3</b> Calculate the pressure, volume, temperature, or moles of a gaseous substance present when given three of the four variables used in the ideal gas law. <b>12.3.4</b> Predict the amount of gas in a chemical reaction by using stoichiometric calculations. <b>12.3.5</b> Formulate a biblical position regarding greenhouse gases.
Lab Day 2	SLM 111–18	TLM 111–18	Lab 12B: <i>An Aquanaut’s World—Predicting the Production of Oxygen</i>	<b>EQ: How can we predict the volume of gas produced in a reaction?</b>
Ethics Day	297	297	Deadly Safety Device?	<b>Objective:</b> <b>12.3.6</b> Formulate a biblical view of the appropriate use of airbag safety.
<b>Review and Test Days</b>			Chapter 12 Test	
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Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 13: SOLIDS AND LIQUIDS (8 DAYS)</b> <b>KEY CHAPTER</b>				
13.1 Intermolecular Forces	299–303	299–303	Web Links: Hydrogen Bonding, Dispersion Forces	EQ: Why is oxygen a gas, water a liquid, and iron a solid at room temperature? <b>Objectives:</b> <b>13.1.1</b> Define <i>intermolecular force</i> . <b>13.1.2</b> Compare dipole-dipole forces, hydrogen bonds, and London dispersion forces. <b>13.1.3</b> Predict the intermolecular force(s) present in a substance on the basis of its composition. <b>13.1.4</b> Predict the melting point of a substance on the basis of the intermolecular forces present.
13.2 Solids	304–11	304–11	Demonstrating Sublimation and Deposition, Demonstrating Lattice Energy How It Works: Cryogenics Web Links: Sublimation of Iodine, Crystal Gallery, Liquid Crystal Gallery	EQ: Why can't I write with a diamond? <b>Objectives:</b> <b>13.2.1</b> Explain the properties of solids using the kinetic-molecular theory. <b>13.2.2</b> Compare crystalline and amorphous solids. <b>13.2.3</b> Explain the significance of the slopes and plateaus on a heating curve. <b>13.2.4</b> Describe what happens at the particle level during phase changes. <b>13.2.5</b> Summarize the three factors that produce network solids.
Lab Day 1	SLM 119–21	TLM 119–21	Lab 13A: <i>Cracking the Crystal</i> —Relating Geology to Chemistry	EQ: What determines the shape of a crystal?
13.3 Liquids	312–21	312–21	Demonstrating the High Surface Tension of Water, Demonstrating Viscosity, Demonstrating the Adhesion of Water, Demonstrating the Relationship between Vapor Pressure and Boiling Web Links: Straw Wrapper Capillary Action, Swamp Coolers Mini Lab: <i>Through the Void</i>	EQ: What makes water so special? <b>Objectives:</b> <b>13.3.1</b> Explain the properties of liquids on the basis of the kinetic-molecular theory and intermolecular attractions. <b>13.3.2</b> Compare evaporation and boiling. <b>13.3.3</b> Trace temperature changes and thermal energy flow during the process of evaporation. <b>13.3.4</b> Use a phase diagram to predict a substance's state of matter under various temperature and pressure conditions.
Lab Day 2	SLM 123–32	TLM 123–32	Lab 13B: <i>Forces of Nature</i> —Exploring Intermolecular Forces in Liquids	EQ: What determines the physical properties of liquids?
Ethics Day	325	325	Cryonics	<b>Objective:</b> <b>13.3.5</b> Respond to the claim that cryonics provides hope while science and technology advance.
<b>Review and Test Days</b>			Chapter 13 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 14: SOLUTIONS (9 DAYS)</b> <b>FOUNDATIONAL CHAPTER</b>				
14.1 The Dissolving Process	327–37	327–37	Case Study: Pharmaceutical Pollution Demonstrating a Supersaturated Solution Web Links: Polarity and Solubility, Hot Ice Mini Lab: <i>Off to the Races</i>	EQ: Why is it so difficult to dissolve sugar in my iced tea? <b>Objectives:</b> 14.1.1 Describe the parts of a solution. 14.1.2 Categorize examples of solutions. 14.1.3 Explain why certain solutes do not dissolve in certain solvents. 14.1.4 Explain how varying conditions will affect the rate of dissolving. 14.1.5 Solve solubility problems using a solubility curve. 14.1.6 Compare unsaturated, saturated, and supersaturated solutions.
Lab Day 1	SLM 133–36	TLM 133–36	Lab 14A: <i>One Giant Solution—Making a Solubility Curve</i>	EQ: How does temperature affect the solubility of a salt?
14.2 Measures of Concentration	338–42	338–42		EQ: How much sugar is really in my soda? <b>Objectives:</b> 14.2.1 Define <i>concentration</i> . 14.2.2 Compare the different ways to report the concentration of solutions. 14.2.3 Solve concentration problems. 14.2.4 Apply principles of solution concentrations to regulate personal sugar consumption.
Lab Day 2	SLM 137–42	TLM 137–42	Lab 14B: <i>Sugar, Sugar—Determining the Sugar Content in Beverages</i>	EQ: How much sugar is really in my favorite beverage?
14.3 Colligative Properties	343–48	343–48	How It Works: Reverse Osmosis Web Link: Osmosis	EQ: How can the same substance be both an antifreeze and a coolant? <b>Objectives:</b> 14.3.1 Define <i>colligative property</i> . 14.3.2 Relate colligative properties to changes in concentration. 14.3.3 Calculate boiling point elevation and freezing point depression. 14.3.4 Explain the process of osmosis. 14.3.5 Explain how colligative properties are used to benefit people.
14.4 Suspensions and Colloids	349–51	349–51	Demonstrating the Tyndall Effect Careers: Serving as an Environmental Scientist	EQ: How are eggs and Jell-O® related? <b>Objectives:</b> 14.4.1 Describe colloids using the terms <i>dispersing medium</i> and <i>dispersed phase</i> . 14.4.2 Compare solutions, suspensions, and colloids. 14.4.3 Give examples of common colloids.

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
Ethics Day	355	355	Wastewater Management	<b>Objective:</b> 14.4.4 Explain the importance of water treatment.
Review and Test Days			Chapter 14 Test	
<b>CHAPTER 15: THERMOCHEMISTRY (8 DAYS)</b> <b>KEY CHAPTER</b>				
15.1 Thermodynamics and Phase Changes	357–63	357–63	Demonstrating How to Create Your Own Heating Curve Web Link: Phase Changes and Heat Mini Lab: <i>Comparing Thermal Energy Transfer</i> (p. 364)	<b>EQ: Does the temperature of water change as it freezes?</b> <b>Objectives:</b> 15.1.1 Define <i>thermochemistry</i> . 15.1.2 Compare temperature, thermal energy, and heat. 15.1.3 Relate the states of matter to the concepts of sensible heat and latent heat. 15.1.4 Calculate energy or temperature during phase changes.
Lab Day 1	SLM 143–48	TLM 143–48	Lab 15A: <i>Hot Shot</i> —Finding the Specific Heat of a Metal	<b>EQ: How can I measure how easily a material heats up?</b>
15.2 Thermodynamics and Chemical Changes	365–70	365–70	Demonstrating Endothermic Reactions	<b>EQ: Are chemical reactions ever cold?</b> <b>Objectives:</b> 15.2.1 Determine whether a given reaction is endothermic or exothermic by calculating its change in enthalpy. 15.2.2 Determine the enthalpy of a reaction on the basis of Hess’s law.
15.3 Reaction Tendency (2 days)	371–81	371–81	Case Study: Entropy and Life Worldview Investigation: Heat Death Web Link: The Cosmological Argument	<b>EQ: Is dynamite dangerous?</b> <b>Objectives:</b> 15.3.1 Define <i>entropy</i> and give some common examples. 15.3.2 Predict reaction tendency on the basis of energy and entropy changes. 15.3.3 Calculate the change in entropy of a chemical reaction. 15.3.4 Predict the favorability of reactions on the basis of the four possible enthalpy-entropy combinations. 15.3.5 Evaluate the various theories of the end of the universe.
Lab Day 2	SLM 149–55	TLM 149–55	Lab 15B: <i>No Anchovies, Please!</i> —Exploring Enthalpies of Solution and Reaction	<b>EQ: How can I measure the energy change during the physical and chemical changes?</b>
Review and Test Days			Chapter 15 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 16: CHEMICAL KINETICS (7 DAYS)</b> <b>KEY CHAPTER</b>				
16.1 Reaction Rates	387–95	387–95	Case Study: Spontaneous Combustion Demonstrating the Effect of Concentration in a Reaction, Demonstrating the Effect of Surface Area and Temperature on Reaction Rates Web Links: Collision Theory, Catalysts Mini Lab: <i>Changing Reaction Rates</i>	EQ: How is a fire different from an explosion? <b>Objectives:</b> <b>16.1.1</b> Define <i>kinetics</i> . <b>16.1.2</b> Summarize the collision theory. <b>16.1.3</b> Explain why thermodynamically favorable reactions don't always occur. <b>16.1.4</b> Summarize changes in reaction rates in response to different reaction conditions.
Lab Day 1	SLM 157–62	TLM 157–62	Lab 16A: <i>Chemistry—A Contact Sport?</i> —Exploring Concentration's Effect on Reaction Rates	EQ: How does concentration affect reaction rate?
16.2 Reaction Mechanisms	396–404	396–404	Careers: Serving as a Pharmacologist How It Works: Sustained-Release Medicine	EQ: How does water form when hydrogen is burned? <b>Objectives:</b> <b>16.2.1</b> Explain how a reaction mechanism describes the steps that make up a chemical reaction. <b>16.2.2</b> Identify intermediate substances in the elementary steps of a reaction. <b>16.2.3</b> Interpret a rate law as it relates to changes in reactant concentration. <b>16.2.4</b> Relate the rate-determining steps to rate laws. <b>16.2.5</b> Formulate a rate law from a data table listing changes in reactant concentration.
Lab Day 2	SLM 163–68	TLM 163–68	Lab 16B: <i>Don't Overreact</i> —Determining a Rate Law	EQ: How can we determine the rate law for a chemical reaction?
Ethics Day	407	407	Medical Marijuana	<b>Objective:</b> <b>16.2.6</b> Determine an informed position on the personal use of medical marijuana.
<b>Review and Test Days</b>			Chapter 16 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 17: CHEMICAL EQUILIBRIUM (8 DAYS)</b> <b>KEY CHAPTER</b>				
17.1 Equilibrium	409–15	409–15	Web Links: Dynamic Equilibrium, Blue Bottle Reaction, Dancing Gummi Bears Mini Lab: <i>Mix, Change, Repeat</i>	EQ: Can chemical reactions go in the reverse direction? <b>Objectives:</b> <b>17.1.1</b> Define <i>reversible reaction</i> . <b>17.1.2</b> Explain how a reaction at equilibrium continues to produce products without changing the amounts of products. <b>17.1.3</b> Write the equation for an equilibrium constant from a balanced chemical equation. <b>17.1.4</b> Solve problems involving equilibrium constants.
17.2 Le Châtelier's Principle	416–23	416–23	Worldview Investigation: Ethanol How It Works: The Haber Process Demonstrating Reversible Color Web Links: Le Châtelier's Principle, Watching the Haber Process	EQ: How can I produce more of the products without adding more of the reactants? <b>Objectives:</b> <b>17.2.1</b> Define <i>Le Châtelier's principle</i> . <b>17.2.2</b> Summarize the effects that various stresses will have on a system in equilibrium. <b>17.2.3</b> Predict the direction that a reaction will shift when stressed. <b>17.2.4</b> Formulate a biblical view of proper uses for ethanol.
Lab Day 1 (2 days)	SLM 169–70	TLM 169–70C	Lab 17A: <i>Stressed Out</i> —Inquiring into Le Châtelier's Principle	EQ: How do chemical systems respond to changing conditions?
17.3 Solution Equilibrium	424–29	424–29		EQ: Is it possible to calculate how much of a substance will dissolve? <b>Objectives:</b> <b>17.3.1</b> Relate the solubility of a salt to its solubility product. <b>17.3.2</b> Convert between solubilities and solubility products of solutes. <b>17.3.3</b> Predict whether a precipitate will form when two solutions are mixed when given the solubility product.
Lab Day 2	SLM 171–74	TLM 171–74	Lab 17B: <i>Precipitous Changes</i> —Exploring Solubility Products	EQ: How can we change the substance that precipitates from a chemical reaction?
<b>Review and Test Days</b>			Chapter 17 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 18: ACIDS, BASES, AND SALTS (7 DAYS)</b> <b>KEY CHAPTER</b>				
18.1 Defining Acids and Bases	435–39	435–39	Case Study: Royal Acid to the Rescue	EQ: Why do we have to test the pH of pool water? <b>Objectives:</b> <b>18.1.1</b> Describe acids and bases according to their physical and chemical properties. <b>18.1.2</b> Summarize the different definitions for acids and bases. <b>18.1.3</b> Classify a substance as an acid or base according to the Arrhenius, Brønsted-Lowry, and Lewis definitions. <b>18.1.4</b> Compare the three acid-base models. <b>18.1.5</b> Explain the relationship between conjugate acids and bases.
18.2 Acid Base Equilibria	440–51	440–51	How It Works: Breathalyzer Demonstrating Red Cabbage and pH Web Links: Virtual pH Meter, Acid-Base Solutions Mini Lab: <i>Acid or Base?</i> (p. 452)	EQ: If vinegar is an acid, why can we put it on foods? <b>Objectives:</b> <b>18.2.1</b> Relate self-ionization of water to pH and pOH. <b>18.2.2</b> Solve pH and pOH problems. <b>18.2.3</b> Compare the strengths of acids. <b>18.2.4</b> Classify acids as monoprotic, polyprotic, diprotic, or triprotic on the basis of their chemical formulas. <b>18.2.5</b> Summarize how indicators work.
Lab Day 1	SLM 175–80	TLM 175–80	Lab 18A: <i>Colorful Chemistry</i> — Exploring Acid-Base Indicators	EQ: How does amount concentration of weak acids affect pH?
18.3 Neutralization	453–58	453–58	Worldview Investigation: Influencing Others Web Links: Neutralization, Buffers Demonstrating Acids, Antacids, and pH	EQ: How do antacids work? <b>Objectives:</b> <b>18.3.1</b> Write balanced chemical equations for neutralization reactions. <b>18.3.2</b> Summarize the titration process. <b>18.3.3</b> Calculate the concentration of a solution from acid-base titration data. <b>18.3.4</b> Define <i>buffer</i> . <b>18.3.5</b> Explain how a buffer system works. <b>18.3.6</b> Give examples of reactions in which buffers function. <b>18.3.7</b> Evaluate different standards of impairment.
Lab Day 2	SLM 181–86	TLM 181–86	Lab 18B: <i>Say Cheese!</i> — Measuring Concentration by Titration	EQ: How do chemists determine amount concentration of acids and bases?
<b>Review and Test Days</b>			Chapter 18 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 19: REDOX REACTIONS (8 DAYS)</b> <b>KEY CHAPTER</b>				
19.1 Redox Reactions (2 days)	463–70	463–70	Web Links: Redox Reaction, Screaming Gummy Reaction	EQ: How can I prevent my car from rusting? <b>Objectives:</b> <b>19.1.1</b> Define <i>oxidation-reduction reaction</i> . <b>19.1.2</b> Relate oxidation and reduction to the exchange of electrons. <b>19.1.3</b> Identify the oxidized and reduced substances in a redox reaction. <b>19.1.4</b> Balance redox reaction equations.
Lab Day 1	SLM 187–92	TLM 187–92	Lab 19A: <i>The Dead, Twitching Frog Mystery</i> —Investigating a Voltaic Cell	EQ: Where does the electricity in a battery come from?
19.2 Electrochemical Reactions	471–80	471–80	Demonstrating the Golden Touch, Demonstrating Electric Metal Web Links: Electroplating, Aluminum Smelting, How Batteries Work Mini Lab: <i>Observing a Voltaic Cell</i>	EQ: How do batteries transform chemical energy to electrical energy? <b>Objectives:</b> <b>19.2.1</b> Define <i>electrochemistry</i> . <b>19.2.2</b> Compare electrolytic and voltaic cells. <b>19.2.3</b> List (or explain) several practical applications of electrochemistry. <b>19.2.4</b> Compare rechargeable cells, fuel cells, and conventional voltaic cells. <b>19.2.5</b> Evaluate the need for battery recycling on the basis of a biblical worldview.
Lab Day 2	SLM 193–97	TLM 193–97	Lab 19B: <i>Danger under the Sink</i> —Using Redox Titration	EQ: How can I use titration of redox reactions?
Ethics Day	483	483–84	Electric Cars	<b>Objective:</b> <b>19.2.6</b> Argue for or against using electric cars to be better stewards of God’s creation.
<b>Review and Test Days</b>			Chapter 19 Test	

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
<b>CHAPTER 20: ORGANIC CHEMISTRY (8 DAYS)</b> <b>KEY CHAPTER</b>				
20.1 Organic Compounds	485–87	485–87	Careers: Serving as an Odor Tester	EQ: How does organic chemistry fit within the broader study of chemistry in general? <b>Objectives:</b> 20.1.1 Define <i>organic compound</i> . 20.1.2 Explain why carbon forms so many compounds. 20.1.3 Describe the basic features of a structural formula. 20.1.4 Distinguish between aliphatic and aromatic organic compounds.
20.2 Hydrocarbons	488–96	488–96	Web Link: Interactive Molecular Structures	EQ: What chemicals are in my shampoo? <b>Objectives:</b> 20.2.1 Identify alkanes, alkenes, and alkynes from their names or formulas. 20.2.2 Draw structural formulas for compounds in common organic families. 20.2.3 Name alkanes, alkenes, and alkynes in accordance with IUPAC rules. 20.2.4 Relate the differences in physical and chemical properties to isomerism. 20.2.5 Contrast cyclic aliphatic compounds and aromatic substances.
20.3 Substituted Hydrocarbons	497–505	497–505	Mini Lab: <i>Isomerism in Substituted Hydrocarbons</i>	EQ: Does substituting one kind of atom for another in a hydrocarbon really make that big of a difference? <b>Objectives:</b> 20.3.1 Explain how functional groups affect a compound's properties. 20.3.2 Identify the functional group associated with each substituted organic compound. 20.3.3 Name substituted organic compounds using IUPAC rules. 20.3.4 Draw structural formulas for compounds with functional groups when given the IUPAC name.
Lab Day 1	SLM 199–202	TLM 199–202	Lab 20A: <i>Makes Scents!</i> —Synthesizing Esters	EQ: Where do artificial scents come from?
20.4 Organic Reactions	506–9	506–9		EQ: How are organic reactions classified? <b>Objectives:</b> 20.4.1 Identify reactions as redox, substitution, addition, or condensation. 20.4.2 Give examples of substitution, addition, and condensation reactions. 20.4.3 Summarize the different reactions involving organic compounds. 20.4.4 Predict the products from different organic reactions.

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
Lab Day 2	SLM 203–6	TLM 203–6	Lab 20B: <i>Squeaky Clean</i> — Investigating Soaps and Detergents	EQ: How do soaps and detergents work?
Review and Test Days			Chapter 20 Test	
<b>CHAPTER 21: BIOCHEMISTRY (10 DAYS)</b> <b>KEY CHAPTER</b>				
21.1 Chemistry of Life	515–16	515–16	Web Link: Metabolism	EQ: Is biochemistry another name for organic chemistry? <b>Objectives:</b> 21.1.1 Define <i>biochemistry</i> . 21.1.2 Explain the relationship between anabolism, catabolism, and metabolism.
21.2 Carbohydrates	517–21	517–21	Demonstrating the Presence of Starch Mini Lab: <i>Simple Sugars</i> ?	EQ: Are carbohydrates good or bad? <b>Objectives:</b> 21.2.1 Define <i>carbohydrate</i> . 21.2.2 Explain the relationship between monosaccharides, disaccharides, and polysaccharides. 21.2.3 Explain the role of carbohydrates in living things.
21.3 Lipids	522–24	522–24		EQ: Why can't I live without fats? <b>Objectives:</b> 21.3.1 Define <i>lipids</i> . 21.3.2 Compare saturated and unsaturated fats. 21.3.3 Explain the role of lipids in living things.
Lab Day 1	SLM 207–11	TLM 207–11	Lab 21A: <i>A Balancing Act</i> — Testing Macronutrients in Food	EQ: Am I eating balanced meals?
21.4 Proteins	525–27	525–27	Web Link: Proteins	EQ: What do proteins do for me? <b>Objectives:</b> 21.4.1 Define <i>protein</i> . 21.4.2 Describe the formation and structure of proteins. 21.4.3 Explain the importance of the structure and shape of a protein molecule.
Lab Day 2	SLM 213–16	TLM 213–16	Lab 21B: <i>The Proof Is in the Jell-O</i> — Investigating Enzymes	EQ: How do enzymes affect biochemical reactions?

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
21.5 Nucleic Acids	528–32	528–32	Worldview Investigation: Abiogenesis Web Link: Replication, Transcription, and Translation	EQ: How do cells know how to do things? <b>Objectives:</b> <b>21.5.1</b> List the three parts of a nucleotide and describe their arrangement. <b>21.5.2</b> Describe how nucleic acids store information in cells. <b>21.5.3</b> Explain how information is transferred from the nucleus to other parts of cells. <b>21.5.4</b> Formulate a response to the theory of abiogenesis from a biblical worldview perspective.
Ethics Day	535	535	Paleo Diets—Ancient Key to Modern Health?	<b>Objective:</b> <b>21.5.5</b> Apply an understanding of biochemistry to decide whether to follow a paleo diet.
<b>Review and Test Days</b>			Chapter 21 Test	
<b>CHAPTER 22: NUCLEAR CHEMISTRY (10 DAYS)</b> <b>ENRICHMENT CHAPTER</b>				
22.1 Inside the Nucleus	537–44	537–44	Careers: Serving as a Nuclear Engineer	EQ: Why do some atoms decay? <b>Objectives:</b> <b>22.1.1</b> Define <i>radioactivity</i> . <b>22.1.2</b> Summarize the progression of scientists' understanding of radioactivity. <b>22.1.3</b> Determine whether a given nuclide is stable. <b>22.1.4</b> Relate the mass defect of a nucleus to its binding energy. <b>22.1.5</b> List instruments used to measure radiation.
22.2 Nuclear Decay	545–54	545–54	Worldview Investigation: Radiometric Dating (p. 555)	EQ: How long will radioactive waste be around? <b>Objectives:</b> <b>22.2.1</b> Compare the types of radioactive decay products. <b>22.2.2</b> Predict the type of decay that will occur for a particular isotope. <b>22.2.3</b> Write balanced equations for radioactive decay. <b>22.2.4</b> Solve half-life problems.
Lab Day 1 (2 days)	SLM 217–23	TLM 217–23	Lab 22A: <i>It's Only a Matter of Time</i> —Investigating Half-Life	EQ: How can I model radioactive decay?

Section	Student Edition Pages	Teacher Edition Pages	Teacher Resources	Essential Questions/Content Objectives
22.3 Using Nuclear Chemistry (2 days)	556–65	556–65	Web Links: Nuclear Fission Simulation, How Do Nuclear Power Plants Work? Mini Lab: <i>Inquiring into Chain Reactions</i>	EQ: Are nuclear power plants worth the risk? <b>Objectives:</b> <b>22.3.1</b> Compare nuclear decay, nuclear reactions, and chemical reactions. <b>22.3.2</b> Distinguish between nuclear fission and fusion. <b>22.3.3</b> Write the nuclear equation for fission reactions. <b>22.3.4</b> Explain the relationship between mass of a fissionable substance and a chain reaction. <b>22.3.5</b> Calculate the energy released in a nuclear reaction. <b>22.3.6</b> Explain how worldview impacts assumptions about and conclusions drawn from radiometric dating.
Lab Day 2	SLM 225–29	TLM 225–29	Lab 22B: <i>Atomic Asteroids—Determining Mass Defect and Binding Energy</i>	EQ: Where does the mass lost in a nuclear reaction go?
Ethics Day	569	569, 569C	Nuclear Power	<b>Objective:</b> <b>22.3.7</b> Construct a position on whether to support or oppose building a nuclear plant near the local community.
<b>Review and Test Days</b>			Chapter 22 Test	