

HS Science Curriculum Maps - Quick Links

[Physics](#)
[Biology](#)
[Chemistry](#)
[General Science](#)

HS Science - Resources

Teacher Feedback Form

Physics

Timeline	Themes/Enduring Understandings/Essential Questions for the Unit	Common Core Standards Addressed	Assessments	Standards Based Skills and Concepts Targeted	Strategies/Practices Used to Teach Skills and Concepts	Resources/Texts Used
1st Quarter - Unit 1	Nature of Physics Enduring Understandings: Physics is a physical science connected to other fields of science. Scientific methods, measurement systems, and mathematical models help physicists describe and explain physical phenomena. Measurement, unit conversions, dimensional analysis, scientific notation, significant figures, and estimates support accurate scientific reasoning. Essential Questions: How is physics connected to other areas of science? How do scientists use measurement and mathematical models to describe physical phenomena? Why are units, conversions, significant figures, and estimates important in physics?	UCP.1 UCP.2 UCP.3	Chapter project: construct a timeline of science advances Section quizzes Chapter test Content labs Spreadsheet on the seven areas of physics	Demonstrate understanding of measurement Perform unit conversions Formulate questions using Bloom's Taxonomy Graph and estimate physical data Describe the theory of continental drift Make estimates and rough calculations to the nearest order of magnitude Apply dimensions to validate equations	Direct instruction Guided practice Independent practice Projects Content labs Inquiry-based activities	Core Resource: Holt Physics and Interactive Edition Supplemental Resource: Advance work from James Walker AP Physics, Fourth Edition
1st Quarter - Unit 2	Linear Motion / Kinematics / Translational Motion Enduring Understandings: Motion in a straight line can be described using displacement, time, velocity, and acceleration. Graphs are important tools for analyzing accelerated and non-accelerated motion. Kinematic equations help describe motion, including freely falling objects and constant acceleration. Essential Questions: How can motion in a straight line be described mathematically? How do graphs represent position, velocity, and acceleration? How can kinematic equations be used to solve motion problems?	UCP.2 UCP.3 SAI.1 SAI.2	Chapter project: construct an accelerometer Section quizzes Chapter test Content labs Homework	Solve math problems involving average speed and constant acceleration Create line graphs using measured values of position and elapsed time Use the area under a velocity-time graph to calculate distance traveled Calculate average speed, final velocity, and acceleration in a lab setting Describe the effect of air resistance on free fall motion Distinguish between distance, displacement, speed, velocity, and acceleration	Direct instruction Guided practice Independent practice Projects Content labs Content maps	Core Resource: Holt Physics and Interactive Edition Supplemental Resource: Advance work from James Walker AP Physics, Fourth Edition; Sticky Tape Demonstrations and Labs
2nd Quarter - Unit 3	Two-Dimensional Motion and Vectors Enduring Understandings: Motion in two dimensions requires an understanding of scalar and vector quantities. Vectors can be analyzed graphically and mathematically using algebra and trigonometry. Projectile motion combines constant horizontal motion with accelerated vertical motion. Essential Questions: How are scalar and vector quantities different? How can vectors be added, resolved, and used to solve motion problems? How does projectile motion combine horizontal and vertical motion?	UCP.2 UCP.3 SAI.1 SAI.2	Chapter project: Sports Physics, Throwing a Hardball Section quizzes Chapter test Content labs Dart gun/blow gun analysis	Describe position, velocity, and acceleration in two dimensions State and define terminology related to two-dimensional motion Distinguish problem-solving strategies for launch-angle problems and horizontal-delivery problems Explain why velocity along the x-plane is invariant Describe the properties of a parabola and how they relate to two-dimensional motion Compare and contrast projectile motion with and without gravity	Direct instruction Guided practice Independent practice Projects Content labs Homework practice	Core Resource: Holt Physics and Interactive Edition Supplemental Resource: Advance work from James Walker AP Physics, Fourth Edition; Sticky Tape Demonstrations and Labs
2nd Quarter - Unit 4	Forces and the Laws of Motion Enduring Understandings: Forces affect the motion of objects and can be described mathematically using Newton's Laws of Motion. Newton's First Law explains inertia, Newton's Second Law explains how net force affects changes in motion, and Newton's Third Law explains action-reaction force pairs. Free-body diagrams and vector analysis help students model and solve force problems. Essential Questions: How do forces affect the motion of objects? How do Newton's Laws of Motion explain inertia, acceleration, and action-reaction pairs? How can free-body diagrams and vector math be used to solve force problems?	UCP.1 UCP.2 SAI.1 SAI.2	Oral presentation or demonstration Chapter tests Traffic accident investigation applying Newton's Laws Research paper on Newton, Galileo, or Einstein related to the study of mass PowerPoint on the four forces of the universe with the possibility of a fifth force Review and assessment quizzes	Understand the historical context between Newtonian physics and the work of Galileo Explain how normal forces are developed and their role in calculating friction Differentiate between inertial and accelerated motion using free-body diagrams Identify action-reaction pairs of forces Solve dynamic problems using free-body diagrams and vector math Describe how contact and field forces affect the movement of electrical charges and free-falling objects Identify forces and their relationship to changes in motion Explain the difference between mass and weight Predict net external force on an object Find the direction and magnitude of normal forces Use coefficients of friction to calculate friction force in an experimental setting	Oral presentation Experiment design involving a multi-force environment Direct instruction Guided practice Content labs Free-body diagram modeling	Core Resource: Holt Physics and Interactive Edition Supplemental Resource: Teacher-selected physics materials and lab resources
3rd Quarter - Unit 5	Work, Power, and Energy Enduring Understandings: Work, energy, and power are related physical quantities that describe force, displacement, energy transfer, and rate of energy use. Energy can be described as kinetic, potential, elastic, thermal, light, electrical, sound, or chemical. Energy transformations occur in systems, and total energy is conserved. Essential Questions: How are work, energy, and power related? How can energy be transferred and transformed? How do kinetic energy, potential energy, and conservation of energy help explain physical systems?	UCP.1 SAI.1	Chapter project: Human Power Lab Section quizzes Chapter test Content labs Problem workbook and worksheets	Explain how energy can be transferred in many different ways Describe how energy is associated with heat, light, electricity, motion, sound, and chemical reactions Describe energy transformations in a pendulum or roller coaster system Analyze situations involving no work, positive work, and negative work Explain the role of friction in dissipating energy Explain the scalar nature of kinetic and potential energy Describe the meaning of the elastic constant in a spring system Calculate kinetic energy Calculate potential energy associated with an object's position Calculate net work when multiple forces are applied to an object	Direct instruction Guided practice Independent practice Projects Content labs Research project Problem-solving practice	Core Resource: Holt Physics and Interactive Edition Supplemental Resource: Advance work from James Walker AP Physics, Fourth Edition; Sticky Tape Demonstrations and Labs

3rd Quarter - Unit 6	Momentum and Collisions UCP.1 SAI.1 Chapter project: Momentum Changes in Sports Section quizzes Chapter test Content labs Formal lab write-up Enduring Understandings: Momentum describes the relationship between mass and velocity. Impulse explains how force applied over time changes momentum. Conservation of momentum helps students analyze collisions and other transfers of momentum. Essential Questions: How do mass and velocity affect momentum? How are impulse and change in momentum related? How can conservation of momentum be used to analyze collisions?		Chapter project: Momentum Changes in Sports Section quizzes Chapter test Content labs Formal lab write-up Explain the role of Newton's Second Law in the development of the impulse-momentum relationship Describe the effects of changing mass and speed on total momentum Relate restraint systems and seat belts to the laws of momentum Identify the relationship between conservation of kinetic energy and conservation of momentum during collisions Define and calculate linear momentum and impulse Calculate change in momentum and relate it to impulse Observe and describe different types of collisions Solve collision problems using conservation of momentum in elastic and inelastic situations	Direct instruction Guided practice Independent practice Projects Content labs Experiment design Formal lab writing	Core Resource: Holt Physics and Interactive Edition Supplemental Resource: Advance work from James Walker AP Physics, Fourth Edition; Sticky Tape Demonstrations and Labs
4th Quarter - Unit 7	Circular Motion and Gravitation UCP.1 UCP.2 Chapter project: Analysis of mass on a string Section quizzes Chapter test Content labs Lab reports Enduring Understandings: Circular motion involves forces directed toward the center of motion. Gravity, centripetal force, inertia, tangential velocity, and related dynamic factors help explain circular and orbital motion. Objects in circular motion can be analyzed using force diagrams and mathematical relationships. Essential Questions: How are rotation and revolution different? What forces act on objects moving in circular motion? How does gravity affect circular and orbital motion?		Chapter project: Analysis of mass on a string Section quizzes Chapter test Content labs Lab reports Distinguish between rotation and revolution Describe and contrast the two speeds of an object such as Earth Identify forces acting on objects moving with uniform circular motion Predict how gravitational force changes when distance between objects changes Calculate force, mass, or distance using the Law of Universal Gravitation Draw vector arrows to represent changes in the direction and magnitude of force Explain Earth-moon interactions using gravity, centripetal force, inertia, centrifugal force, tangential velocity, and other dynamic parameters	Direct instruction Guided practice Independent practice Projects Content labs Demonstrations Lab report writing	Core Resource: Holt Physics and Interactive Edition Supplemental Resource: Advance work from James Walker AP Physics, Fourth Edition; Sticky Tape Demonstrations and Labs
4th Quarter - Unit 8	Periodic Waves and Sound UCP.1 UCP.2 Chapter project: Human Ear Section quizzes Chapter test Content labs Presentation Enduring Understandings: Periodic motion occurs when a restoring force moves an object toward equilibrium. Oscillating systems can produce waves, including mechanical, water, sound, and light waves. Wave behavior can be described using wavelength, amplitude, frequency, speed, interference, and boundary conditions. Essential Questions: How does a restoring force produce periodic motion? How are transverse and longitudinal waves different? How can wave speed, frequency, wavelength, and amplitude be used to describe wave behavior?		Chapter project: Human Ear Section quizzes Chapter test Content labs Presentation Identify everyday examples of transverse and longitudinal waves Describe mechanical waves using wavelength, amplitude, frequency, and speed Calculate energy transferred by compression waves of different amplitudes and frequencies Explain how waves propagate from vibrating sources Explain why intensity decreases with the square of the distance from a point source Define beat frequency Identify elastic potential energy stored in stretched or compressed elastic objects Explain maximum acceleration and velocity in relation to the rest position of a vibrating body Apply the wave equation to find velocity, frequency, or wavelength Compare and contrast standing wave behavior at free and fixed boundaries Describe how beats are formed by sound waves Describe constructive and destructive interference	Direct instruction Guided practice Independent practice Projects Content labs Demonstrations Presentation practice	Core Resource: Holt Physics and Interactive Edition Supplemental Resource: Advance work from James Walker AP Physics, Fourth Edition; Sticky Tape Demonstrations and Labs

Biology

Timeline	Themes/Enduring Understandings/Essential Questions for the Unit	Common Core Standards Addressed	Assessments	Standards Based Skills and Concepts Targeted	Strategies/Practices Used to Teach Skills and Concepts	Resources/Texts Used
1st Quarter - Unit 1: Introduction to Biology and Characteristics of Life	Introduction to Biology and Characteristics of Life Enduring Understandings: Biology is the study of living things and the characteristics that distinguish living from nonliving things. Scientific investigation depends on observation, experimentation, measurement, data analysis, and communication of results. Cells, life processes, and basic chemistry provide a foundation for understanding living systems. Essential Questions: What are the essential parts of an experiment? What major characteristics distinguish living from nonliving things?	A.12.5 A.12.7 B.12.3 B.12.4 G.12.1 A.12.1 F.12.1 F.12.2	Formal lab discussions Lab reports Graphs Data analysis tasks Tests Quizzes Journal reflections Computer model Concept mapping	Describe the common characteristics of life Compare and contrast the cellular structures and degrees of complexity of prokaryotic and eukaryotic cells Explain how early prokaryotic cells are connected to the development of more complex cells Identify major biological concepts connected to cells, life processes, and scientific investigation	Lecture and notes on Chapter 1 Lecture and notes on Chapter 2 Lab safety instruction Lab write-up instruction Scientific method activity Microscope study activity Outdoor living/nonliving thing activity Video or play of cell functions Jeopardy review	Core Resource: Biology by Glencoe Science textbook Supplemental Resource: Internet resources
1st Quarter - Unit 2: Cell and Organelle Structure and Function	Cell and Organelle Structure and Function Enduring Understandings: Cell structures are specialized to perform functions necessary for life. Prokaryotic and eukaryotic cells differ in structure, organization, and complexity. Organelles work individually and together to support the functioning of the cell as a whole. Essential Questions: What is the endosymbiont theory? How do prokaryotes and eukaryotes differ in structure and function? What are the main organelles of eukaryotic cells? How do organelles function individually and as a whole?	A.12.5 A.12.7 A.12.12 B.12.3 B.12.4 G.12.1 A.12.1 F.12.1 F.12.2 F.12.4	Lecture checks Worksheets Vocabulary checks WebQuest 3-D cells project	Explain how the structure of an organelle is essential to its function Identify the parts of a cell under a microscope Manipulate microscope parts correctly Create a wet mount Compare cell structures and functions	Lecture and notes Interactive presentation Online video Cell analogy activity Student-created play or video explaining organelle functions Microscope practice Wet mount practice	Core Resource: Biology by Glencoe Science textbook Supplemental Resource: Internet resources

1st Quarter - Unit 3: Ecology	Ecology	A.12.1 A.12.5 A.12.7	Chapter tests Chapter quizzes	Evaluate evolution using evidence such as viral evolution, antibiotic resistance, and pesticide resistance	Lecture on biomes Lecture on energy flow Lecture on evolution	Core Resource: Biology by Glencoe Science textbook
	Enduring Understandings:	A.12.7	Research paper on the effect of introducing new species	Understand succession, carrying capacity, logistic and exponential growth, limiting factors, niches, endangered organisms, and habitat fragmentation	Interactive presentation	Supplemental Resource: Internet resources
	Ecosystems are shaped by interactions among organisms and between organisms and their environment.	B.12.1 B.12.5 C.12.1	Ecological data analysis	Discuss the effects of phosphates and nitrates on water quality and soil richness	Scenario-based ecological inference activity	Current event articles
	Population changes, competition, cooperation, invasive species, pollution, and resource use affect biodiversity.	C.12.2 C.12.6 C.12.7		Infer changes in ecosystems caused by new species, environmental conditions, chemicals, and air, water, or earth pollution	Current event analysis Scientific journal analysis	Scientific journal analysis
	Ecological data and current events help students understand changes in ecosystems.	F.12.5 F.12.6 F.12.7		Analyze current event articles and scientific journal information related to ecology		
	Essential Questions:	F.12.8 F.12.9 F.12.10 F.12.11				
	What is the difference between a population and a community?					
	How do organisms cooperate and compete in ecosystems?					
	How might destruction, overpopulation, invasive species, and overharvesting influence Inorganic Chemistry and Water Properties	F.12.3 F.12.11 D.12.4	Formal lab Lab reports Graphs	Explain the role of water in cell metabolism Explain how water properties are essential to the functioning of living things at the cellular, tissue, and organismal levels	Dialysis bag model of the cell membrane Diffusion and osmosis lab Wet mount of plant and animal cells Plasmolysis and turgidity observations	Core Resource: Biology by Glencoe Science textbook
	Water's molecular structure and properties support life at the cellular, tissue, and organismal levels.	D.12.1 D.12.2 D.12.3	Data analysis tasks Tests Quizzes	Predict water movement into and out of cells with various solute concentrations Explain how the cell membrane functions as a regulatory structure and protective barrier	Hydrogen bond diagrams Biological phenomenon explanation using water properties	Supplemental Resource: Internet resources
Chemical bonding, polarity, diffusion, osmosis, and membrane structure affect how substances move in living systems.	D.12.11 D.12.12	Journal reflections	Describe transport mechanisms across the plasma membrane			
The cell membrane functions as both a protective barrier and a regulatory structure.						
Essential Questions:						
What is a polar molecule, and how does polarity affect bonding between water molecules?						
What is the difference between a covalent bond						
2nd Quarter - Unit 5: Biochemistry and Organic Chemistry	Biochemistry and Organic Chemistry	F.12.9 F.12.10 D.12.4	Formal lab Lab reports Graphs	Use organic model kits to build functional groups Use diagrams to recognize and classify organic compounds	Organic molecule model building Diagram analysis Food nutrient indicator lab Cell respiration investigation	Core Resource: Biology by Glencoe Science textbook
	Enduring Understandings:	D.12.3 D.12.2 D.12.6 D.12.12	Data analysis tasks Tests Quizzes Journal reflections	Use indicator solutions, such as Benedict's test and biuret reagent, to identify carbohydrates and proteins Measure the rate of cell respiration in various organisms under different conditions using digital equipment Identify photosynthetic pigments through chromatography	Photosynthetic pigment chromatography Online lab activities	Supplemental Resource: Internet resources Online lab activities
	Organic molecules provide the building blocks and energy sources needed by living things.					
	Carbohydrates, proteins, lipids, and nucleic acids have different structures and functions in organisms.					
	Laboratory indicators and models help students identify and classify biological molecules.					
	Essential Questions:					
	What are the building blocks of carbohydrates, proteins, lipids, and nucleic acids?					
	What is each type of biomolecule used for in living things?					
	What methods and indicators are used to identify nutrients in foods?					
	What are the main reactants and products of photosynthesis and cellular respiration?					
2nd Quarter - Unit 6: Cellular Transport and Homeostasis	Cellular Transport and Homeostasis	A.12.7 C.12.3 C.12.4	Formal lab Lab reports Graphs	Relate the structure of cell organelles to their function Explain the role of water in cell metabolism	Membrane structure modeling Transport mechanism comparison Active and passive transport analysis	Core Resource: Biology by Glencoe Science textbook
	Enduring Understandings:	C.12.5 F.12.1 F.12.2 F.12.4 F.12.9 F.12.10 F.12.11	Data analysis tasks Tests Quizzes Journal reflections	Discuss the conditions of active transport versus passive transport Explain how cells perform endocytosis and exocytosis Identify the main components of the plasma membrane Explain the functions of plasma membrane components Connect cellular transport to homeostasis	Endocytosis and exocytosis modeling Homeostasis examples in plant and animal systems Online lab activities	Supplemental Resource: Internet resources Online lab activities
	The structure of the plasma membrane determines how substances enter and leave the cell.					
	Cells use passive transport, active transport, endocytosis, and exocytosis to move materials.					
	Homeostasis depends on the ability of cells and organisms to regulate internal conditions.					
	Essential Questions:					
	What types of molecules enter and leave cells easily through the plasma membrane?					
	Which substances use transport proteins?					
	How does the structure of the cell membrane relate to its function in transporting substances?					
	How do large substances enter and exit the plasma membrane?					
3rd Quarter - Unit 7: Energy Transformations—Photosynthesis and Cellular Respiration	What is the role of the cell membrane in Energy Transformations: Photosynthesis and Cellular Respiration	A.12.7 C.12.3 C.12.4 C.12.5 F.12.1 F.12.2 F.12.4 F.12.9 F.12.10 F.12.11	Video notes Lab reports Worksheets Quizzes Tests	Discuss the role of NAD and NADP as electron carriers and reducing agents Explain the role of enzymes in relation to activation energy Explain how enzymes are influenced by temperature and pH Connect mitochondria and chloroplast structure to cellular respiration and photosynthesis Compare the reactants and products of photosynthesis and cellular respiration	Use laboratory equipment to measure the rate of cellular respiration and photosynthesis in biological systems Surface area to volume ratio modeling with manipulatives Video-supported instruction Lab investigation Worksheet practice	Core Resource: Biology by Glencoe Science textbook
	Enduring Understandings:					Supplemental Resource: Internet resources
	Photosynthesis and cellular respiration are connected processes that transform energy and matter in living systems.					
	Mitochondria and chloroplasts have structures that support the movement of nutrients, gases, and ATP.					
	Enzymes, coenzymes, gases, and ATP play important roles in energy transformation.					
	Essential Questions:					
	How does the structure of the mitochondria and chloroplast enable the movement of nutrients, CO ₂ , and ATP into and out of cells?					
	What are the main reactants and products of photosynthesis and cellular respiration?					
	How are photosynthesis and cellular respiration different and similar?					
	What is the role of coenzymes, ATP, and gases in photosynthesis and cellular respiration?					
3rd Quarter - Unit 8: Cell Cycle, Mitosis, and Meiosis	Cell Cycle, Mitosis, and Meiosis	A.12.1 F.12.1 F.12.2 F.12.3 F.12.4	Lecture notes Worksheets Project Quizzes Mitosis booklet Activity Test	Describe how meiosis results in the formation of haploid gametes Analyze the importance of meiosis in sexual reproduction Compare and contrast meiosis and mitosis Illustrate how sorting and recombining genes in sexual reproduction results in varied gene combinations in offspring Explain how organisms begin their life cycles as a single cell Explain how successive generations of embryonic cells form by cell division in multicellular organisms Summarize the stages of the cell cycle Compare and contrast a virus and a cell Relate the stages of viral cycles to the cell cycle Explain how cells differentiate in	Modeling mitosis and meiosis DNA extraction from cheek cells Mitosis and meiosis comparison activity Punnett square practice using Mendel's laws of heredity Family pedigree project Interactive presentation on Mendelian genetics Monohybrid and dihybrid cross practice	Core Resource: Biology by Glencoe Science textbook
	Enduring Understandings:					Supplemental Resource: Internet resources
	The cell cycle controls growth, repair, reproduction, and development in living organisms.					
	Mitosis and meiosis are different processes with different roles in growth and sexual reproduction.					
	Genetic variation results from sorting and recombining genes during sexual reproduction.					
	Essential Questions:					
	What is the difference between the prokaryotic and eukaryotic genome?					
	What cells typically undergo mitosis?					
	When does mitosis occur?					
	How does a normal cell become a cancerous cell?					

3rd Quarter - Unit 9: DNA Structure, DNA Function, Genetic Engineering, and Genetics	DNA Structure, DNA Function, Genetic Engineering, and Genetics	A.12.1 F.12.3 F.12.4 F.12.6	Research paper on mutations Worksheets Mutation project Quizzes Replication, transcription, and translation activity Test DNA mutation and chromosomal mutation comparison Stem cell research discussion	Describe the basic structure of DNA, including the role of hydrogen bonding Explain how DNA replication results in transmission and conservation of the genetic code Describe how transcription and translation result in gene expression Differentiate among the end products of replication, transcription, and translation Cite evidence that the genetic code is universal Explain how genetic technologies have impacted medicine, forensics, and agriculture Explain how stem cells can differentiate because of chemical signals encoded in genetic code Distinguish among inheritance patterns caused by dominant, recessive.	Gel electrophoresis for restriction enzyme analysis DNA line-up activity DNA replication model Transcription and translation model DNA genetic code kit lab DNA wheat germ lab Article summary Inheritance pattern analysis	Core Resource: Biology by Glencoe Science textbook Supplemental Resource: Internet resources Current event articles on the use of biotechnology
	Enduring Understandings: DNA stores and transmits genetic information through replication, transcription, and translation. Mutations can affect genetic information and may have consequences for organisms. Genetic technologies have changed medicine, forensics, agriculture, and scientific research. Inheritance patterns help explain and predict traits in offspring. Essential Questions: How is an organism able to take up foreign DNA and express genes as part of its phenotype? What is the main process of DNA Evolution					
4th Quarter - Unit 10: Evolution	Evolution describes changes in species over time through genetic variation, environmental pressure, and natural selection. Small genetic changes can accumulate in populations and affect the gene pool over generations. Evidence from fossils, comparative structures, embryology, biochemistry, and classification supports explanations of evolutionary relationships. Essential Questions: How do small changes in genetics accumulate in a gene pool? How does genetic drift affect a population? What is the evidence for evolution? How does artificial selection provide experimental evidence for evolution?	A.12.1 F.12.3 F.12.4 F.12.6	Dichotomous key assignment Leaf lab Classification lab Test Paper on Islamic perspective on evolution Bottleneck genes activity Natural selection lab Quizzes	Describe the theory that life on Earth arose as a single primitive prokaryote about 4 billion years ago Analyze how complex multicellular organisms evolved once cells with nuclei developed Describe how mutations in sex cells may be passed to successive generations Explain how resulting phenotypes may help, harm, or have little effect on offspring success in the environment Describe the relationship between environmental changes and changes in the gene pool of a population Understand that classification is based on analysis of inherited features and common ancestry Understand that genetic variation arises from sexual reproduction, genetic recombination, meiosis, crossing over, and mutation	Natural selection manipulatives Evidence-based explanation of evolution using documentation, examples, and experiments Comparison of mechanisms of evolution Dichotomous key practice Leaf lab Classification lab Natural selection lab Discussion of Islamic perspective on evolution	Core Resource: Biology by Glencoe Science textbook Supplemental Resource: Internet resources Quran/Hadith
	Enduring Understandings: Evolution describes changes in species over time through genetic variation, environmental pressure, and natural selection. Small genetic changes can accumulate in populations and affect the gene pool over generations. Evidence from fossils, comparative structures, embryology, biochemistry, and classification supports explanations of evolutionary relationships. Essential Questions: How do small changes in genetics accumulate in a gene pool? How does genetic drift affect a population? What is the evidence for evolution? How does artificial selection provide experimental evidence for evolution?					
4th Quarter - Unit 11: Organizing Life's Diversity, Plants, and Animals	Organizing Life's Diversity, Plants, and Animals	A.12.1 A.12.3 A.12.4 B.12.1 B.12.5 F.12.5 F.12.6 F.12.7 F.12.9 F.12.11 F.12.12	Lecture checks Worksheets Mini lab 22.1 WebQuest 7	Describe how the environment and interactions between organisms can affect the number and diversity of species in an ecosystem Relate the structure, complexity, and organization of organ systems to methods of obtaining, transforming, releasing, and eliminating matter and energy used to sustain the organism Recognize that organisms have innate and learned behavioral responses to internal and external stimuli, including tropic responses in plants Use scientific evidence, including the fossil record, homologous structures, embryological development, and biochemical similarities, to classify organisms and show probable evolutionary relationships and common ancestry	Dissections: worms, frogs, and crayfish Concept mapping Plant trait categorization Chordate, sponge, chlidarian, flatworm, and roundworm trait categorization Arthropod, invertebrate, amphibian, fish, bird, and mammal trait categorization Mini lab 24.1 WebQuest	Core Resource: Biology by Glencoe Science textbook Supplemental Resource: Internet resources
	Enduring Understandings: Classification systems help organize living things based on structures, traits, and evolutionary relationships. Plants and animals have specialized structures and adaptations that support survival and reproduction. Organisms interact with their environments, and those interactions affect biodiversity and ecosystem stability. Essential Questions: How are living things classified? What are the key features of plants? How have plants adapted to life on land? What are the major groups of plants? What are the key features of animals? Which anatomical features mark branch points on the animal evolutionary tree? What are the major animal phyla?					

Chemistry

Timeline	Themes/Enduring Understandings/Essential Questions for the Unit	Common Core Standards Addressed	Assessments	Standards Based Skills and Concepts Targeted	Strategies/Practices Used to Teach Skills and Concepts	Resources/Texts Used
1st Quarter	Unit 1: Scientific Measurement Unit 2: The Atom and Matter Unit 3: The Periodic Table Enduring Understandings: Scientific measurement allows chemists to collect, compare, and communicate accurate data. Atoms are the basic units of matter, and atomic structure helps explain the identity and behavior of elements. The periodic table organizes elements by structure and properties, allowing patterns in reactivity, atomic radius, ionic radius, electronegativity, and ion formation to be identified and explained. Essential Questions: How are measurements used in the study of chemistry? How are numbers written using significant figures and scientific notation? How are numbers manipulated using scientific notation? How are laboratory tools connected to the level of accuracy achieved in measurements? What is the basic unit of matter in the universe? What identifies an element and makes each element unique? What is the currently accepted model of the atom? What is an orbital? What is the pattern of electron filling? What does the location of an element on the periodic table indicate about its reactivity? How is an element identified? What are the major trends in atomic radius, ionic radius, and electronegativity?	A.12.5 B.12.4 D.12.1 D.12.2 D.12.3 D.12.4 D.12.5 D.12.6 H.12.7	Homework problems Classwork worksheets Individual and group presentations Laboratory notebooks and procedures Quizzes Tests	Use scientific measurements Use scientific notation Use the metric system Apply accuracy and measurement concepts Use metric prefixes and significant figures Identify physical and chemical properties Distinguish between elements and compounds Calculate percentages of elements in compounds Describe atomic structure and atomic models Describe electron orbitals and diagrams Use vocabulary related to atoms, elements, the law of definite proportions, Dalton's atomic theory, the wave-mechanical model, valence electrons, quantum numbers, orbitals, atomic radius, and the gold foil experiment Classify elements Explain the placement of an unknown element on the periodic table based on properties Compare and contrast properties within a group and within a period Explain periodic trends in terms of atomic structure Calculate atomic mass of an element Explain trends of cation and anion formation Use vocabulary related to atomic radius, electronegativity, family, group, ionic radius, ionization energy, metal, and metalloid	Teacher-led discussions Student-led discussions Individual and group presentations Hands-on laboratory work Teacher lecture Socratic questioning in group activities Laboratory demonstrations Videos In-class worksheets and examples	Core Resource: Prentice Hall Chemistry textbook Supplemental Resource: Workbook; resource book; small scale laboratory notebook

2nd Quarter	Unit 4: Bonding and Naming Unit 5: Matter and Energy, Part I	D.12.10 H.12.6 H.12.7	Homework problems Classwork worksheets Individual and group presentations Laboratory notebooks and procedures Quizzes Tests	Distinguish among ionic, molecular, and metallic substances based on properties Draw Lewis dot diagrams Distinguish between polar and nonpolar bonds and molecules Compare physical properties of substances based on chemical bonds and intermolecular forces Use vocabulary related to octet rule, cation, anion, ionic compound, salt, crystal lattice, monatomic ion, binary compound, polyatomic ions, covalent bond, molecular compound, nonpolar covalent bond, polar covalent bond, hydrogen bond, single bond, Lewis structure, symmetry, double bond, triple bond, molecular formula, and empirical formula Draw particle diagrams Differentiate between different forms of matter Interpret and understand phase change diagrams Describe how to separate a given mixture Use vocabulary related to condensation, deposition, freezing, fusion, gas phase, heat, heat of fusion, heat of vaporization, kinetic molecular theory, liquid phase, solid phase, sublimation, temperature, and vaporization	Teacher-led discussions Student-led discussions Individual and group presentations Hands-on laboratory work Teacher lecture Socratic questioning in group activities Laboratory demonstrations Videos In-class worksheets and examples	Core Resource: Prentice Hall Chemistry textbook Supplemental Resource: Workbook; resource book; small scale laboratory notebook
	Enduring Understandings: Chemical bonds form because atoms interact through valence electrons, electronegativity, and stability patterns. The properties of substances are connected to the types of bonds and intermolecular forces present. Matter can be classified by composition and properties, and mixtures can be separated using appropriate techniques. The kinetic molecular theory helps explain phases of matter, phase changes, heating and cooling curves, and energy transfer. Essential Questions: Why do elements form chemical bonds? What is the octet rule? How is electronegativity used to determine bond type? When will ionic bonds conduct electricity? How does symmetry determine polarity? What is the difference between molecular and empirical formulas? How can the kinetic molecular theory be used to describe matter and energy? What is homogeneous matter? What is heterogeneous matter? What is a pure substance? What is the law of definite proportions, and when does it apply? What is a mixture? What is a solution? What techniques are used to separate mixtures? When should each separation technique be used?					
3rd Quarter	Unit 5: Matter and Energy, Part II Unit 6: Math of Chemistry Unit 6b: Solutions Unit 7: Equilibrium	D.12.10 H.12.6 H.12.7	Homework problems Classwork worksheets Individual and group presentations Laboratory notebooks and procedures Quizzes Tests	Calculate heat in joules Convert between Celsius and Kelvin Describe an ideal gas Describe kinetic molecular theory Apply the gas laws Describe the relationship between vapor pressure and molecular polarity Use reference tables related to vapor pressure and solubility Name and write formulas for compounds Convert between grams, moles, and molecules Determine empirical and molecular formulas Identify reactions Balance equations Predict products of reactions Convert moles using a balanced equation Recognize the aqueous phase in a chemical reaction Differentiate between a solution and a mixture Calculate molarity and parts per million Recognize colligative properties of solutions, including ionic and covalent solutes Define collision theory Recognize endothermic and exothermic reactions Recognize and label parts of the potential energy diagram Relate temperature change to delta H Define major factors that affect chemical reactions Explain the effect of a catalyst on a chemical reaction Define Le Châtelier's principle Understand the effect of stresses on a system at equilibrium	Teacher-led discussions Student-led discussions Individual and group presentations Hands-on laboratory work Teacher lecture Socratic questioning in group activities Laboratory demonstrations Videos In-class worksheets and examples	Core Resource: Prentice Hall Chemistry textbook Supplemental Resource: Workbook; resource book; small scale laboratory notebook
	Enduring Understandings: The kinetic molecular theory explains relationships among pressure, volume, temperature, phases of matter, gas behavior, and vapor pressure. The mole allows chemists to count particles that are too small to see and to connect mass, moles, molecules, formulas, and balanced equations. Solutions can be described qualitatively and quantitatively using molarity, parts per million, percent composition, solubility, and colligative properties. Chemical reactions depend on particle collisions, energy changes, catalysts, and equilibrium conditions. Essential Questions: How can kinetic molecular theory be used to describe the relationship between pressure, volume, and temperature? What are the phases of matter? What are the parts of a phase change diagram? How do potential and kinetic energy relate to the phase change diagram? What is average kinetic energy? How is heat energy measured? What equation is used to measure heat? What assumptions are made for an ideal gas? How are pressure, volume, and temperature related through Boyle's Law, Charles's Law, and the Combined Gas Law? When is each gas law applied?					
4th Quarter	Unit 8: Acids and Bases Unit 9: Redox and Electrochemistry Unit 10: Organic Chemistry	D.12.11 D.12.12 H.12.6 H.12.7	Homework problems Classwork worksheets Individual and group presentations Laboratory notebooks and procedures Quizzes Tests	Identify and define an Arrhenius acid and Arrhenius base Identify acids, bases, and salts as electrolytes Identify neutralization reactions as double replacement reactions Identify neutralization reactions by the products produced Define titration Differentiate between strong acids and bases and weak acids and bases Connect acid and base strength to pH level Identify and manipulate the pH scale as a logarithmic scale Use vocabulary related to acidity, alkalinity, Arrhenius acid, Arrhenius base, electrolyte, hydrogen ion, hydronium ion, indicator, neutralization, pH scale, salt, and titration Identify elements that form cations and anions Define redox Define reduction and oxidation Identify reducing agents and oxidizing agents Apply rules for assigning oxidation values for elements in compounds Recall the crisscross method for making compounds Define redox reactions and balance redox reactions Define corrosion reactions Identify and write redox half-reactions Define voltaic and electrolytic cells and the associated parts of each Compare and contrast voltaic and electrolytic cells Define electroplating	Teacher-led discussions Student-led discussions Individual and group presentations Hands-on laboratory work Teacher lecture Socratic questioning in group activities Laboratory demonstrations Videos In-class worksheets and examples	Core Resource: Prentice Hall Chemistry textbook Supplemental Resource: Workbook; resource book; small scale laboratory notebook
	Enduring Understandings: Acids and bases have characteristic properties and can be identified through ionization, pH, electrolyte behavior, and neutralization reactions. Oxidation-reduction reactions involve the transfer of electrons and can be represented through oxidation numbers, half-reactions, voltaic cells, electrolytic cells, and electroplating. Organic compounds are classified by carbon-based structures, hydrocarbon families, functional groups, isomers, and reaction types. Essential Questions: What are the properties and characteristics of acids and bases? What are the differences between acids and bases? What is an electrolyte? Are acids and bases electrolytes? What is the Arrhenius theory of acids and bases? What is a neutralization reaction? What products are formed in an acid-base reaction? What is a titration? What is ionization? How is ionization related to pH level and the strength of acids and bases? What are the electrical properties of the elements? What is meant by redox? What is reduction? What is oxidation?					

General Science						
Timeline	Themes/Enduring Understandings/Essential Questions for the Unit	Common Core Standards Addressed	Assessments	Standards Based Skills and Concepts Targeted	Strategies/Practices Used to Teach Skills and Concepts	Resources/Texts Used

1st Quarter	Unit 1: Introduction to Science	A.12.1	Homework problems	Identify the areas of physics, chemistry, and astronomy and their contributions to careers	Teacher-led discussions	Khan Academy; MIT OpenCourseWare
	Unit 2: Measuring Motion and Dynamics	A.12.2 A.12.3 A.12.4 A.12.5 A.12.6 A.12.7	Classwork worksheets Individual and group presentations Virtual lab Quizzes Tests	Illustrate the role of serendipity in scientific discoveries Create a concept map of the various divisions and branches of science Differentiate between a theory and a law and give examples in the history of science State scientific ideas in a mathematical context using equations Manipulate equation terms using algebraic methods, including isolating variables Explain and identify the roles of dependent and independent variables in a controlled scientific experiment Use scientific apparatus, including microscopes, telescopes, and spectroscopes, in an experiment Explain how scientific tools work and what they detect Describe how significant figures track precision and place limitations on final mathematical answers and instrument tolerance Explain the difference between SI base units and derived units and give examples of each Interpret line graphs, bar graphs, and pie graphs using extrapolation and interpolation skills Describe the measurements needed to determine average speed and acceleration Combine parallel vectors in the same and opposite directions to find a resultant Identify units and magnitudes of speed,	Student-led discussions Individual and group presentations Hands-on laboratory work Teacher lecture Socratic questioning in group activities Laboratory demonstrations Videos In-class worksheets and examples	
2nd Quarter	Enduring Understandings: Natural science includes multiple branches, including physics, chemistry, astronomy, and related fields that help explain the natural world. Scientific laws, theories, measurement systems, mathematical models, and experimental design help scientists describe and investigate physical events. Motion and forces can be described using distance, displacement, speed, velocity, acceleration, friction, gravity, and Newton's Laws of Motion. Essential Questions: What are the main branches of natural science, and how are they related? How are scientific laws and theories different? How can mathematics describe physical events? Why is a consistent system of units important in science? How are SI units, derived units, unit cancellation, significant figures, and graphing used in scientific work? How are motion, distance, displacement, speed, velocity, and acceleration related? How do scalar and vector quantities differ? How do unbalanced forces affect the motion of objects? How do friction, gravity, and Newton's Laws explain motion?					
	Unit 3: Work and Energy Unit 4: Waves, Sound, and Light	B.12.3 B.12.4 B.12.5 C.12.2	Homework problems Classwork worksheets Individual and group presentations Laboratory notebooks and procedures Quizzes Tests	Determine whether work is being done in given circumstances Calculate the amount of work being done Describe how energy cannot be created or destroyed, only changed in form Explain how energy is different from work Describe situations where gravitational potential energy is useful or harmful Explain how energy can be associated with biotic and abiotic sources Explain how energy is transferred through the web of life List situations in which potential energy converts to kinetic energy and kinetic energy converts to potential energy Describe the rise and fall of a basketball using kinetic and potential energy Explain why machines are not 100% efficient Describe situations in sports that connect work and energy Describe the movement of a pendulum or roller coaster using different energy forms and the effect of non-conservative forces such as friction Distinguish between the motion of the medium and the motion of the wave Apply principles of simple harmonic motion to the motion of a swing Compare and contrast a mass-spring system with a simple pendulum Distinguish between transverse and longitudinal waves by drawing model diagrams of each Explain how oscillating waves can be polarized by film or sunglasses Identify the medium for different types of waves Describe the motion of a water molecule	Teacher-led discussions Student-led discussions Individual and group presentations Hands-on laboratory work Teacher lecture Socratic questioning in group activities Laboratory demonstrations Videos In-class worksheets and examples	Khan Academy; MIT OpenCourseWare
3rd Quarter	Enduring Understandings: Work, power, simple machines, mechanical advantage, and energy transformations help explain how force and motion are connected. Energy can be potential, kinetic, mechanical, or non-mechanical, and it can be transformed from one form to another. Waves transfer energy through mechanical and electromagnetic processes. Sound and light can be described through wave properties including wavelength, amplitude, frequency, period, speed, interference, and the Doppler Effect. Essential Questions: How are work and power defined and calculated? How do simple machines and mechanical advantage make work easier? How are potential energy and kinetic energy different? How is energy transformed in physical and living systems? How do waves transfer energy? How are mechanical and electromagnetic waves different? How are transverse and longitudinal waves different? How are crest, trough, amplitude, wavelength, frequency, period, and wave speed used to describe waves? What happens when wave interference occurs? How are loudness, pitch, and hearing related to sound waves? How does light behave as both a particle and a wave?					
	Unit 5: Atoms and the Periodic Table Unit 6: Structure of Matter Unit 7: Chemical Reactions and Kinetics	D.12.1 D.12.2 D.12.3 D.12.4 D.12.5 D.12.6 D.12.7 D.12.8 D.12.9 D.12.10 D.12.11 D.12.12	Homework problems Classwork worksheets Individual and group presentations Laboratory notebooks and procedures Quizzes Tests	Summarize the main ideas of Dalton's atomic theory List the charge, mass, and location of the three subatomic particles found within atoms Predict how many valence electrons a nitrogen atom has Explain why atoms on the periodic table are essentially neutral Explain how the path of an electron varies between Bohr's atom and the quantum-mechanical atom Calculate the number of protons, electrons, and neutrons an atom has from atomic mass and atomic number Predict which isotope of nitrogen is most common based on the periodic table and its isotopes Describe why elements in the modern periodic table are arranged by atomic number rather than atomic mass Compare and contrast the characteristics of metals, nonmetals, and semiconductors Describe reactivity trends in the periodic table using bromine as an example Predict the charge of metallic and nonmetallic ions using family number Define Avogadro's constant and explain how it relates to the mole Explain why a graph relating the amount of a particular element and its mass is a linear function Solve math problems relating gram mass and moles Classify substances as mixtures or compounds Explain the relationship between bonding, chemical composition, melting point, and	Teacher-led discussions Student-led discussions Individual and group presentations Hands-on laboratory work Teacher lecture Socratic questioning in group activities Laboratory demonstrations Videos In-class worksheets and examples	Khan Academy; MIT OpenCourseWare
	Enduring Understandings: Atomic theory explains the structure of atoms and the organization of the periodic table. The periodic table reflects patterns in atomic structure, electron arrangement, element properties, ions, isotopes, atomic mass, and the mole. Matter can be classified as mixtures, compounds, or bonded substances with properties shaped by chemical structure. Chemical reactions involve changes in atoms and molecules, energy transfer, conservation of mass, reaction types, reaction rates, catalysts, and equilibrium. Essential Questions: How did Dalton's atomic theory improve on earlier atomic ideas? What are the charge, mass, and location of each part of an atom? How are the Bohr model and quantum-mechanical model different? How is the periodic table organized? How are electrons related to periodic trends and chemical properties? How are protons, neutrons, electrons, atomic number, mass number, isotopes, and atomic mass related? How is the mole related to Avogadro's number and molar mass? How are compounds and mixtures different? How does chemical structure affect the properties of matter? How do ionic, covalent, metallic, and organic bonds form?					

4th Quarter	Unit 8: Chemistry of Life Unit 9: Chemical Structure and Function of Cells Unit 10: Ecology Unit 11: Classification Enduring Understandings: Living things are made of organic molecules, including carbohydrates, lipids, proteins, and nucleic acids. Cell structures and organelles support life functions, homeostasis, transport, photosynthesis, and cellular respiration. Ecosystems are shaped by biotic and abiotic factors, nutrient cycles, food webs, population changes, symbiosis, and environmental change. Classification systems organize organisms according to traits, evolutionary relationships, and new scientific evidence. Essential Questions: Of what are living things made? How are organic molecules formed? How do organic molecules interact to support life? How do cell structures and organelles relate to their functions? How are prokaryotic and eukaryotic cells different? How are plant and animal cells different? How does the cell membrane function as a selective barrier? How are diffusion, osmosis, and active transport connected to homeostasis? How are photosynthesis and cellular respiration related to energy in living systems? How do biotic and abiotic factors cycle in an ecosystem?	E.12.3 E.12.4 E.12.5 F.12.1 F.12.2 F.12.3 F.12.4 F.12.5 F.12.6 F.12.7 F.12.8 F.12.9 F.12.10 F.12.11 F.12.12	Homework problems Classwork worksheets Individual and group presentations Laboratory notebooks and procedures Quizzes Tests	Identify the three subatomic particles found in atoms Compare and contrast isotopes of an element Define chemical compound Describe the two main types of chemical bonds Explain why water molecules are polar Differentiate between solutions and suspensions Define acidic solutions and basic solutions Describe the composition and function of each group of organic compounds Explain how chemical reactions affect chemical bonds in compounds Describe how energy changes affect how easily a chemical reaction will occur Explain why enzymes are important to living things Explain cell theory Name the basic cell structures Compare and contrast prokaryotes and eukaryotes Describe the main function of the cell wall Describe the function of the cell nucleus Identify the main roles of the cytoskeleton Describe the functions of the major cell organelles Identify the main function of the cell membrane Describe diffusion Compare and contrast osmosis, facilitated diffusion, and active transport Describe cell specialization Identify levels of organization in multicellular organisms Explain where plants get the energy they need to produce food	Teacher-led discussions Student-led discussions Individual and group presentations Hands-on laboratory work Teacher lecture Socratic questioning in group activities Laboratory demonstrations Videos In-class worksheets and examples	Khan Academy; MIT OpenCourseWare
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