

Grade 8 Science Curriculum Maps

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Grade: 8 Subject: Science	Unit 1: Chemical Bonding
Big Idea/Rationale	<ul style="list-style-type: none"> • Chemical bonding forms all compounds using elements' valence electrons
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Bonds are made with only valence electrons. • Three types of bonds: Ionic, Covalent, Metallic
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Structure of atom? Number of valence electrons determines reactivity? • Valence electrons interact by gaining/losing or sharing? Stable elements have 8 valence electrons? Ionic bonds use Electromagnetic attraction.
Content (Subject Matter)	<ul style="list-style-type: none"> • Four families of elements (Alkali, Alkaline, Halogen, Noble) and their reactivity. • 8 valence electrons is stable, 1 and 7 valence electrons reactive. • Ionic gain/lose electrons. • Covalent and metallic share electrons.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.6.B.1: Compare the properties of reactants with the properties of the products when two or more substances are combined and react chemically.
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets, Periodic Table of Elements
Notes	

Grade: 8 Subject: Science	Unit 2: Chemical Reactions
Big Idea/Rationale	<ul style="list-style-type: none"> • Chemical Reactions Change Properties of Substances.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Signs of a chemical reaction. • Properties change due to reactions. • Controlling rate of reaction.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Changes that show chemical reaction? • Four types of chemical reaction? • Chemical reactions are balanced? • Law of Conservation of Mass? • Exothermic and Endothermic reactions?
Content (Subject Matter)	<ul style="list-style-type: none"> • Show 5 changes that indicate reaction. • Describe 4 types of reactions. • Balance reactions. • Define exothermic and endothermic. • Factors that control rate of reactions.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.6.B.1: Compare the properties of reactants with the properties of the products when two or more substances are combined and react chemically. • 5.2.12.B.3: Balance chemical equations by applying the law of conservation of mass.
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets, Periodic Table of Elements
Notes	

Grade: 8 Subject: Science	Unit 3: Chemical Compounds
Big Idea/Rationale	<ul style="list-style-type: none"> • Properties of Ionic and Covalent Compounds. • Properties of Acid and Base Compounds.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Describe the properties of Ionic and Covalent compounds. • Describe the properties of Acids and Bases.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Using properties of substance identify it as Ionic or Covalent? • Four properties of acid /bases? • Measure the relative strength of acids and bases?
Content (Subject Matter)	<ul style="list-style-type: none"> • Describe 4 properties of Ionic and Covalent compounds. • Describe 4 properties of Acids and Bases. • Measure pH of substances using pH scale. • Identify 4 uses of Acids and Bases.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.8.A.5: Identify unknown substances based on data regarding their physical and chemical properties • 5.2.8.A.7: Determine the relative acidity and reactivity of common acids, such as vinegar or cream of tartar, through a variety of student-designed investigations
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets, Periodic Table of Elements
Notes	

Grade: 8 Subject: Science	Unit 4: Atomic Energy
Big Idea/Rationale	<ul style="list-style-type: none"> • Radioactivity and Types of Radioactive Decay.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Radioactivity is the breakdown of atoms. • 3 types of radioactivity and relative strengths. • Fission vs Fusion.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Different radioactivity cause changes in the element? • Alpha particles are helium nuclei? • Beta particles are charged electrons? • Gamma is pure energy? • Fission Fusion?
Content (Subject Matter)	<ul style="list-style-type: none"> • Describe 3 types of radioactivity. • Describe result of radioactive decay. • Difference of Fission vs. Fusion. • Uses of radioactivity.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.12.B.3: Balance chemical equations by applying the law of conservation of mass. • 5.2.8.B.1: Explain, using an understanding of the concept of chemical change, why the mass of reactants and the mass of products remain constant. • 5.2.12.A.4: Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes.
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets, Periodic Table of Elements
Notes	

Grade: 8 Subject: Science	Unit 5: Studying Space
Big Idea/Rationale	<ul style="list-style-type: none"> • Astronomy the first science. Telescopes and mapping of the sky.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Structure of the solar system as heliocentric. • Types of telescopes and the Electromagnetic spectrum. • Constellations and the night sky.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Early astronomer contributions? • Optical telescopes? • Electromagnetic energy telescopes? • Constellations? • Size of the universe?
Content (Subject Matter)	<ul style="list-style-type: none"> • Describe contributions made by 6 early astronomers. • Differences of reflecting and refracting telescopes. • List the 7 parts of the EM spectrum and their relative ability to penetrate atmosphere. • Number of constellations and how star distance is measured.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.1.8.D.3: Demonstrate how to safely use tools, instruments, and supplies. • 5.4.12.A.1: Explain how new evidence obtained using telescopes (e.g., the phases of Venus or the moons of Jupiter) allowed 17th-century astronomers to displace the geocentric model of the universe • 5.4.12.A.6: Argue, citing evidence (e.g., Hubble Diagram), the theory of an expanding universe.
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets, Computer program “New Moon”
Notes	

Grade: 8 Subject: Science	Unit 6: Stars, Galaxies and the Universe
Big Idea/Rationale	<ul style="list-style-type: none"> • Stars are balls of matter undergoing fusion, with a defined life cycle, clustered into galaxies, in an every expanding universe.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Stars are classified by their temperature and brightness. • The HR diagram is the tool used to classify stars. • 3 types of galaxies. • Universe began at one point and continues to expand.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Range of temperature and brightness of stars? • Absolute and apparent magnitudes? • The HR diagram is used to classify stars? • 3types of galaxies and the milky way? • Big bang theory?
Content (Subject Matter)	<ul style="list-style-type: none"> • As magnitude number decreases the brightness of star increases. • 5 types of stars and the life cycle of stars. • Use the HR diagram to classify stars and describe the life cycle of stars. • Describe the 3 types of galaxies. • Big Bang 13.7 billion years ago and still expanding.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.4.12.A.6: Argue, citing evidence (e.g., Hubble Diagram), the theory of an expanding universe. • 5.4.12.A.3: Analyze an H-R diagram and explain the life cycle of stars of different masses using simple stellar models.
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets, Computer program “New Moon”
Notes	

Grade: 8 Subject: Science	Unit 7: Formation of the Solar System
Big Idea/Rationale	<ul style="list-style-type: none"> • Solar System formed 5 billion years ago from a gravity caused collapse of a nebula forming the Sun with all the remaining material left to orbit the Sun.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • There is a balance between gravity and pressure that keeps the Sun stable. • The structure of the Sun and process that creates energy from matter. • The structure of Earth including the atmosphere. • How planets move and stay in their orbits.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Relationship of gravity and fusion? • Effect the Sun’s activity has on Earth? • Earth has change over the last 5 billion years? • The Earth and all solar system bodies orbit the Sun based on mass and distance?
Content (Subject Matter)	<ul style="list-style-type: none"> • As gravity and pressure get closer to equal the Sun becomes a stable star using its matter to release energy. • Most of the solar material forms the Sun while the remaining material forms the planets and other solar objects. • Gravity causes left over solar material to form planets and other objects. • All planets follow predictable orbits.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.4.12.A.2: Collect, analyze and critique evidence that supports the theory that the Earth and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets, Computer programs “New Moon” and “9 planets”.
Notes	

Grade: 8 Subject: Science	Unit 8: A Family of Planets
Big Idea/Rationale	<ul style="list-style-type: none"> • Solar System is made up of 8 planets, dwarf planets, comets, asteroids, and debris all orbiting the Sun.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • There are 2 types of planets, gas and terrestrial. • There are many moons orbiting all planets except Venus and Mercury. • What makes a dwarf planet? • Comets asteroids and meteors role in the solar system. • Solar vs. lunar eclipses.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • What are the gas giants? The terrestrials? • Why is there a need for a new category dwarf planet? • Cause for lunar and solar eclipses? • Characteristics of other moons? • Effects of other solar objects (Asteroids, comets, meteors)?
Content (Subject Matter)	<ul style="list-style-type: none"> • Know the order of the planets and how they were formed in the solar nebula. • List the known dwarf planets and why they are designated as such. • Lunar phases and how they affect the solar and lunar eclipses. • Significance of other moons in the solar system. • The impact of asteroids and comets on life on Earth.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.4.12.A.2: Collect, analyze and critique evidence that supports the theory that the Earth and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago. • 5.4.8.A.1: Analyze moon-phase, eclipse and tidal data to construct models that explain how relative positions and motions of the Sun, Earth and Moon cause these three phenomena. • 5.4.6.A.4: Compare and contrast the major physical characteristics of solar system objects using evidence in the form of data tables and photographs.
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets, Computer programs “New Moon” and “9 planets”.
Notes	

Grade: 8 Subject: Science	Unit 9: Matter in Motion
Big Idea/Rationale	<ul style="list-style-type: none"> • Motion is measured from an assumed stationary reference point and is effected by forced.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Reference point is assumed stationary and all motion is measured from it. • Unbalanced forces cause accelerations and balanced forces keep motion constant. Friction is a force that opposes motion. • Gravity is a force of attraction dependent on the masses and their distance apart. • Mass is constant while weight is the result of gravity on mass.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • What is Speed? Velocity? Acceleration? How are they related? • Forces only applied by push or pull? • Unbalanced forces cause? • 2 types of friction? Which has the greatest effect? • Mass and distance effect gravity?
Content (Subject Matter)	<ul style="list-style-type: none"> • Define mass, reference point, speed, velocity, acceleration and friction. • Determine net force. • Calculate velocity, acceleration and gravity. • Describe fluid and sliding friction.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.6.E.1: Model and explain how the description of an object’s motion from one observer’s view may be different from a different observer’s view. • 5.2.8.E.1: Calculate the speed of an object when given distance and time • 5.2.12.E.1: Compare the calculated and measured speed, average speed, and acceleration of an object in motion, and account for differences that may exist between calculated and measured values • 5.2.8.E.2: Compare the motion of an object acted on by balanced forces with the motion of an object acted on by unbalanced forces in a given specific scenario. • 5.2.6.E.3: Demonstrate and explain the frictional force acting on an object with the use of a physical model.
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets.
Notes	

Grade: 8 Subject: Science	Unit 10: Forces and Motion
Big Idea/Rationale	<ul style="list-style-type: none"> • Motion is affected by gravity and friction. Mass in motion has momentum.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Air resistance and gravity effect falling objects. Free fall occurs when no air resistance. • Projectile motion is the result of gravity and horizontal velocity. • Newton’s Laws of motion. • Momentum is result of velocity and mass.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • What is Speed? Velocity? Acceleration? How are they related? • Forces only applied by push or pull? • Unbalanced forces cause? • 2 types of friction? Which has the greatest effect? • Mass and distance effect gravity?
Content (Subject Matter)	<ul style="list-style-type: none"> • Define free fall and projectile motion. • Determine net force. • Calculate velocity, acceleration and gravity. • Describe fluid and sliding friction.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.8.E.2: Compare the motion of an object acted on by balanced forces with the motion of an object acted on by unbalanced forces in a given specific scenario. • 5.2.6.E.3: Demonstrate and explain the frictional force acting on an object with the use of a physical model. • 5.2.12.E.3: Create simple models to demonstrate the benefits of seatbelts using Newton's first law of motion • 5.2.4.E.4: Investigate, construct, and generalize rules for the effect that force of gravity has on balls of different sizes and weights
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets.
Notes	

Grade: 8 Subject: Science	Unit 11: Forces in Fluids
Big Idea/Rationale	<ul style="list-style-type: none"> • Pressure in fluid is equal in all directions is the result of applied forces.
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Fluid pressure increase with depth and density. • Buoyant force is opposite gravity and equal to the weight of the displaced fluid. • The faster a fluid moves the lower its pressure. • Differences in fluid pressure result in fluids moving toward the lower pressure.
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Why does air pressure change with altitude? With density? How are they related? • How does water pressure change compare to air pressure change? • What is buoyant force and how does it affect an object in a fluid? • How does an airplane produce lift? • How is a force applied to a fluid is felt throughout the fluid?
Content (Subject Matter)	<ul style="list-style-type: none"> • Define atmospheric pressure. • Give examples of fluids moving from high to low pressure. • Compare buoyancy and density in relation to a floating object. • Describe the forces on an airplane and the way these forces are controlled.
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.6.E.4: Predict if an object will sink or float using evidence and reasoning
Materials and Resources	<ul style="list-style-type: none"> • Homework Handouts, Lab Worksheets.
Notes	