

Integrated Science Curriculum Maps

Unit 1: An Introduction to Matter

Unit 2: Changes in Matter

Unit 3: Elements and the Periodic Table

Unit 4: Carbon Chemistry

Unit 5: Chemical Reactions

Unit 6: Atoms, Bonding, Acids, Bases, and Solutions

Unit 7: Motion

Unit 8: Forces

Unit 9: Forces in Fluids

Unit 10: Work and Machines

Unit 11: Energy and Power

Unit 12: Thermal Energy and Heat

Unit 13: Magnetism, Electromagnetism, Electric Charges, and Current

Grade: 11 Subject: Integrated Science II	Unit 1: An Introduction to Matter
Big Idea/Rationale	<ul style="list-style-type: none"> • Describing Matter • Measuring Matter • Particles of matter • Elements from earth
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Explain the difference between weight and mass • Calculate the density of substances using SI units for mass and volume • Describe Dalton’s theory of atoms • Identify chemical bonds as holding atoms together in molecules • Compare elements, compounds, and mixtures
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Identify states of matter • Distinguish between chemical and physical changes of matter • Identify characteristic properties of matter • Compare mixtures and pure substances and describe elements and compounds • Explain the difference between mass and weight • Calculate density using SI units • Explain how atoms make up all matter • Describe Dalton’s theory of atoms • Identify chemical bonds as holding atoms together in molecules • Describe how the density of gold allows it to be panned • Describe how copper and iron are extracted from their ores
Content (Subject Matter)	<ul style="list-style-type: none"> • States of matter • Solid • Liquid • Gas • Characteristic property • Boiling point • Melting Point • Physical change • Chemical change • Mixture • Solution • Pure Substance • Element • Compound • Mass • Weight • Gram/kilogram

	<ul style="list-style-type: none"> • Volume • cc/ml • Density • Metric system • Meter stick • Balances • Graduated cylinder • Atom • Molecule • Chemical Bond • Unique mass and all the same for each element • Extraction process for gold, copper and iron • Ore • Electrolysis • Chemical activity
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.12.A.2: Account for the differences in the physical properties of solids, liquids, and gases • 5.2.12.B.1: Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Materials and Resources	<ul style="list-style-type: none"> • Balance • Meter stick • Graduated cylinder • Blocks • Marble • Water
Notes	

Grade: 11 Subject: Integrated Science II	Unit 2: Changes in Matter
Big Idea/Rationale	<ul style="list-style-type: none"> • Properties of Solids, Liquids, and Gases • Behavior of Gases • Graphing Gas Behavior • Physical and Chemical Changes
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Define and differentiate solids, liquids, and gases in terms of shape and volume • Compare the particle motion in solids, liquids, and gases • Define the relationship between pressure, volume, temperature of gases • Describe changes of state and the energy involved • Distinguish between chemical and physical changes of matter • Compare elements, compounds, and mixtures
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Define and differentiate solids, liquids, and gases in terms of shape and volume • Compare the particle motion in solids, liquids, and gases • Define the relationship between volume and pressure of a gas and state Boyle's • Define the relationship between pressure and temperature of a gas. • Define the relationship between volume and temperature of a gas and state. Charles' law. • Construct and interpret graphs for Boyle's and Charles' laws • Describe the differences between physical and chemical changes. • Explain how energy is involved in changes of matter. • Describe changes of state. • Define chemical reactions and explain ways that energy can change in chemical reactions
Content (Subject Matter)	<ul style="list-style-type: none"> • Solid • Atomic motion in solids • Crystalline solids • Amorphous solids • Liquids • Atomic motion in liquids • Fluid • Viscosity • Gases • Atomic motion in gases • Temperature • Pressure • P-V relationship

	<ul style="list-style-type: none"> • Boyle's law • P-T relationship • T-V relationship • Charles' law • Graphs • Direct proportion • Inverse proportion • Physical change • Chemical change • Thermal energy • Chemical energy • Melting • Freezing • Vaporization • Evaporation • Boiling • Condensation • Sublimation • Chemical reactions • Law of Conservation of Energy
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. • 5.2.12.A.2: Account for the differences in the physical properties of solids, liquids, and gases • 5.2.12.C.1: Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases.
Materials and Resources	<ul style="list-style-type: none"> • Computer • Davidson.edu website applet • CBB Chapter 2
Notes	

Grade: 11 Subject: Integrated Science II	Unit 3: Elements and the Periodic Table
Big Idea/Rationale	<ul style="list-style-type: none"> • Organizing the Elements • Metals • Nonmetals and Metalloids
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Identify the groups within the periodic table and state what properties elements in a group have in common • Describe uses of the periodic table
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • State key events in the historical development of the periodic table. • List the information in the periodic table and describe how it is organized. • Describe uses of the periodic table. • Define valence electrons and tell how they are related to the periodic table. • Describe chemical and physical properties of metals. • Identify and describe different groups of metals • Describe how the reactivity of metals changes across the periodic table. • Locate non-metals and metalloids in the periodic table. • Compare the physical and chemical properties of non-metals with those of metals and describe the properties of metalloids. • Describe how nuclear fusion forms new elements inside stars
Content (Subject Matter)	<ul style="list-style-type: none"> • Mendeleev • Atomic mass • Periodic table • Nucleus • Protons • Neutrons • Electrons • Atomic mass unit (amu) • Atomic number • Chemical symbol • Group – family • Period • Valence electrons • Hardness • Shininess • Malleability • Ductility

	<ul style="list-style-type: none"> • Conductors • Magnetic • Reactivity • Corrosion • Alloy • Alkali metals • Alkaline earth metals • Transition metals • Lanthanides • Actinides • Nonmetals • Diatomic molecules • Halogens • Noble gases • Metalloids • Semiconductor • Plasma • Nuclear fusion • Supernova
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.12.A.1: Use atomic models to predict the behaviors of atoms in interactions. • 5.2.12.A.3: Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties. • 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"> • Rutherford's Mystery Box • CBB Chapter 3
Notes	

Grade: 11 Subject: Integrated Science II	Unit 4: Carbon Chemistry
Big Idea/Rationale	<ul style="list-style-type: none"> • Chemical Bonding of Carbon • Carbon Compounds • Biopolymers
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Explain why carbon is so versatile in bonding • Identify properties organic compounds have in common • List the four main classes of polymers in living things and compare them • Define and name hydrocarbons
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Explain why carbon can form bonds in many different arrangements • List different forms of pure carbon • Identify the properties many organic compounds have in common • Define hydrocarbons and describe the kinds of carbon chains in them • Define and name examples of substituted hydrocarbons • Prepare esters in the laboratory • Manufacture soap and determine the properties of surfactants • Prepare and identify a series of organic esters from organic acids and alcohols • List the four main classes of polymers in living things and name examples • Compare the polymers in living things to one another • Identify nutrients found in food other than polymer nutrients
Content (Subject Matter)	<ul style="list-style-type: none"> • Diamond • Graphite • Fullerenes • Organic compound • Hydrocarbon • Carbon chains <ul style="list-style-type: none"> ○ Straight ○ Branched ○ Rings • Molecular formula • Subscripts • Structural formula • Isomer • Saturated hydrocarbon • Unsaturated hydrocarbon • Substituted hydrocarbon • Halogen compounds • Alcohols

	<ul style="list-style-type: none"> ○ Hydroxyl group ● Organic acids <ul style="list-style-type: none"> ○ Carboxyl group ● Ester ● Polymer ● Monomer ● Synthetic polymer ● Nutrients ● Digestion ● Biopolymers <ul style="list-style-type: none"> ○ Carbohydrates ○ Proteins ○ Lipids ○ Nucleic acids ● Glucose ● Complex carbohydrates ● Starch ● Cellulose ● Amino acids ● Lipids ● Fatty acid ● Cholesterol ● DNA ● Nucleotides ● Vitamins ● Minerals
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> ● 5.2.12.A.5: Describe the process by which solutes dissolve in solvents
Materials and Resources	<ul style="list-style-type: none"> ● Ester lab kit ● Oil, sodium hydroxide, ethanol, salt
Notes	

Grade: 11 Subject: Integrated Science II	Unit 5: Chemical Reactions
Big Idea/Rationale	<ul style="list-style-type: none"> • Matter and Its Changes • Describing Chemical Reactions • Controlling Chemical Reactions • Fire and Fire Safety
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Apply the principle of conservation of mass to balancing chemical equations • Identify and describe the three categories of chemical reactions • Describe the relationship of energy to chemical reactions • List factors that control the rate of chemical reactions
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Define and compare elements, compounds, mixtures, atoms, and molecules • Compare chemical changes to physical changes • Explain how chemical bonds change during chemical reactions • Identify evidence of chemical reactions • Describe information conveyed in a chemical equation • Apply the principle of conservation of mass to balancing chemical equations • Identify and describe three classes of chemical reactions • Describe the relationship of energy to chemical reactions • List factors that control the rate of chemical reactions • Identify the three conditions necessary to maintain a fire • Explain how water inhibits combustion • List fire safety measures for the home • Describe properties and uses of selected elements • Explain the differences between manufactured and natural diamonds
Content (Subject Matter)	<ul style="list-style-type: none"> • Chemistry • Element • Compound • Mixture • Solution • Physical change • Chemical change • Chemical Reaction • Precipitate • Atom • Molecule • Chemical bond • Chemical equation

	<ul style="list-style-type: none"> • Chemical formula • Subscript • Reactants • Products • Conservation of mass • Balancing chemical equations • Classes of chemical reactions <ul style="list-style-type: none"> ○ Synthesis ○ Decomposition ○ Replacement • Energy changes in chemical reactions <ul style="list-style-type: none"> ○ Exothermic ○ Endothermic • Activation energy • Rates of chemical reactions • Controlling factors <ul style="list-style-type: none"> ○ Concentration ○ Surface area ○ Temperature • Catalyst • Inhibitors • Fire triangle <ul style="list-style-type: none"> ○ Fuel ○ Oxygen ○ Heat • Home fire safety <ul style="list-style-type: none"> ○ Sources of fire ○ Fighting fires ○ Preventing trouble
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.12.B.2: Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel. • 5.2.12.B.3: Balance chemical equations by applying the law of conservation of mass. • 5.2.12.D.2: Describe the potential commercial applications of exothermic and endothermic reactions • 5.2.12.D.5: Model the change in rate of a reaction by changing a factor
Materials and Resources	<ul style="list-style-type: none"> • Chemicals needed for demos
Notes	<ul style="list-style-type: none"> • CI Chapter 1

Grade: 11 Subject: Integrated Science II	Unit 6: Atoms, Bonding, Acids, Bases, and Solutions
Big Idea/Rationale	<ul style="list-style-type: none"> • Ionic Bonds • Covalent Bonds • Working With Solutions • Describing Acids and Bases • Acids and Bases in Solution
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Describe how an ionic bond forms • Identify properties of ionic compounds • Describe how a covalent bond forms • Identify properties of molecular compounds • Define and compare solutions and suspensions • Identify factors that affect solubility • Identify and describe properties of acids and bases • Describe the pH scale and how it is used
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Explain the difference between an atom and an ion • Describe how an ionic bond forms • Identify properties of ionic compounds • Describe how covalent bonds form • Identify properties of molecular compounds • Distinguish between polar and nonpolar bonds and between polar and nonpolar compounds • Define and compare solutions and suspensions • Explain what happens to particles of a solute when a solution forms • Identify those factors that affect solubility of a substance • Describe how solutes affect the freezing and boiling points of solvents • Identify and describe the properties of acids and give examples • Identify and describe the properties of bases and give examples • Describe the ions formed when acids and bases are dissolved in water • Describe the pH scale and tell how it is used • Explain what happens in a neutralization reaction • Distinguish between chemical and mechanical digestion, and tell the importance of each • Explain how pH affects digestion
Content (Subject Matter)	<ul style="list-style-type: none"> • Ion • Ionic bond • Polyatomic ion • Crystal • Covalent bond • Double bond

	<ul style="list-style-type: none"> • Molecular compounds • Polar • Nonpolar • Suspension • Solution • Solvent • Solute <ul style="list-style-type: none"> ○ Ionic Solutes ○ Molecular Solute • Dilute solution • Concentrated solution • Solubility • Saturated solution • Unsaturated solution • Factors affecting solubility <ul style="list-style-type: none"> ○ Temperature ○ Solvent type • Freezing point depression • Boiling point elevation • Acid • Base • Litmus • Indicator • Hydrogen ion • Hydroxide ion • pH scale • Acid rain • Acid – Base Neutralization • Mechanical digestion • Chemical digestion
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.12.A.6: Relate the pH scale to the concentrations of various acids and bases. • 5.2.12.B.1: Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
Materials and Resources	<ul style="list-style-type: none"> • Chemicals needed for demos
Notes	

Grade: 11 Subject: Integrated Science II	Unit 7: Motion
Big Idea/Rationale	<ul style="list-style-type: none"> • Describing and Measuring Motion • Slow Motion of Earth’s Tectonic Plates • Acceleration
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Explain when an object is in motion and how motion is relative to a reference point. • Calculate an object’s speed and velocity using SI units of distance • Graph motion showing changes in distance as a function of time • Calculate the acceleration of an object
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Explain when an object is in motion and how motion is relative to a reference point • Calculate an object’s speed and velocity using SI units of distance • Graph motion showing changes in distance as a function of time • Explain the slow movement of Earth’s plates and calculate their speed • Describe what happens to the motion of an object as it accelerates • Calculate the acceleration of an object and graph changing speed and distance of an accelerating object • Calculate the acceleration due to gravity
Content (Subject Matter)	<ul style="list-style-type: none"> • Motion • Reference point • Distance • SI units • Meter • Speed • Constant speed • Average speed • Velocity • Graphs • Tectonic plates • Theory of plate tectonics • Metric Conversions • KHDbcm • Acceleration <ul style="list-style-type: none"> ○ Increasing speed ○ Decreasing speed ○ Changing direction ○ Formula • Graphs

Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none">• 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.• 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.
Materials and Resources	<ul style="list-style-type: none">• Computers, software and sensors for lab experiments
Notes	

Grade: 11 Subject: Integrated Science II	Unit 8: Forces
Big Idea/Rationale	<ul style="list-style-type: none"> • The Nature of Force • Force, Mass, and Acceleration • Friction and Gravity • Action and Reaction • Orbiting Satellites
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Explain how balanced and unbalanced forces are related to motion • State Newton’s first law of motion and define inertia • State Newton’s second law of motion and explain how force and mass are related to acceleration • Describe friction and identify the factors that determine the friction force between two surfaces • State Newton’s third law of motion • State the universal law of gravitation • Describe the effects of gravity and air resistance on an object in free fall
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Explain how balanced and unbalanced forces are related to motion • State Newton’s first law of motion and define inertia • State Newton’s second law of motion and explain how force and mass are related to acceleration • Explain how mass differs from weight • State the universal law of gravitation • Describe the effects of gravity and air resistance on an object in free fall • Develop packaging to protect a raw egg from gravity • Describe friction and identify the factors that determine the friction force between two surfaces • State Newton’s third law of motion • Define and calculate momentum and state the law of conservation of momentum • Explain how a rocket lifts off the ground • Describe the forces that keep a satellite in orbit
Content (Subject Matter)	<ul style="list-style-type: none"> • Force • Net force • Balanced forces • Unbalanced forces • Inertia • Mass • Newton’s first law of motion • Newton’s second law of motion • $F = m \times a$

	<ul style="list-style-type: none"> • Gravity • Free fall • Projectile motion • Air resistance • Terminal velocity • Weight • $W=mg$ • Law of universal gravitation • Gravity • Free fall • Projectile motion • Air resistance • Terminal velocity • Weight • $W=mg$ • Law of universal gravitation • Newton's third law of motion • Equal and opposite • Action and reaction • Momentum • $Momentum=mv$ • Law of conservation of momentum • Rocket • Satellite • Centripetal force
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. • 5.2.12.E.3: Create simple models to demonstrate the benefits of seatbelts using Newton's first law of motion. • 5.2.12.E.4: Measure and describe the relationship between the force acting on an object and the resulting acceleration.
Materials and Resources	<ul style="list-style-type: none"> • Computers, software and sensors for lab experiments • Friction carts, masses, Newton's balls
Notes	

Grade: 11 Subject: Integrated Science II	Unit 9: Forces in Fluids
Big Idea/Rationale	<ul style="list-style-type: none"> • Pressure • Pascal's Principle • Archimedes' Principle • Bernoulli's Principle
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Define and calculate pressure • Define the buoyant force and its effect
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Define and calculate pressure • Recognize that pressure decreases at higher altitudes and increases at greater depths • Identify and explain examples of balanced pressure • State Pascal's principle and recognize applications of the principle • Explain how a hydraulic system works • Define the buoyant force and its effect • State Archimedes' principle • Explain how the density of an object determines whether it floats or sinks • State Bernoulli's principle • Explain the application of Bernoulli's principle to flight
Content (Subject Matter)	<ul style="list-style-type: none"> • Pressure • Pascal • Fluid • Fluid pressure • Air pressure • Balanced pressure • Air pressure and elevation • Water pressure and depth • Pascal's principle • Force pump • Hydraulic system • Pascal's principle in nature • Buoyant force • Archimedes' principle • Floating and sinking • Density • Buoyancy and density • Bernoulli's principle

	<ul style="list-style-type: none">• Objects in flight• Bernoulli's principle at home
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none">• 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Materials and Resources	<ul style="list-style-type: none">• Soda cans, bottles, hydrometer, graduated cylinder, alcohol, oil, water, syrup
Notes	

Grade: 11 Subject: Integrated Science II	Unit 10: Work and Machines
Big Idea/Rationale	<ul style="list-style-type: none"> • Work • Mechanical Advantage and Efficiency • Simple Machines • Machines in the Human Body
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Relate work and energy • Explain what machines do and how they make work easier • Describe the six types of simple machines and how to calculate their advantages
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Identify when work is done on an object • Calculate the work done on an object • Explain what machines do and how they make work easier • Identify the difference between actual and ideal mechanical advantage • Calculate the efficiency of a machine • Describe the six types of simple machines • Calculate the ideal mechanical advantage of four types of simple machine • Define compound machines • Explain how the body uses levers and wedges
Content (Subject Matter)	<ul style="list-style-type: none"> • Work • Amount of work • Joule • Machine • Input force • Output force • Efficiency • Multiplying distance • Changing direction • Mechanical advantage <ul style="list-style-type: none"> ○ Of multiplying force ○ Of multiplying distance ○ Of changing direction • Actual mechanical advantage • Ideal mechanical advantage • Simple machines • Inclined plane <ul style="list-style-type: none"> ○ Wedge ○ Screw ○ Lever ○ Wheel and axle

	<ul style="list-style-type: none"> ○ Pulley ● Ideal mechanical advantage <ul style="list-style-type: none"> ○ Inclined plane ○ Wedge ○ Screw ○ Lever – 3 classes ○ Wheel and axle ○ Pulley ● Fulcrum ● Compound machine ● Gears ● Bones ● Muscles ● Tendons ● Incisors
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> ● 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Materials and Resources	<ul style="list-style-type: none"> ● Collection of simple machines
Notes	

Grade: 11 Subject: Integrated Science II	Unit 11: Energy and Power
Big Idea/Rationale	<ul style="list-style-type: none"> • The Nature of energy • Energy Conversion and Conservation • Energy Conversion and Fossil Fuels • Power
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Define and calculate potential and kinetic energy • State the law of conservation of energy
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Relate work and energy • Define and calculate potential and kinetic energy • List different forms of energy • Identify and describe conversions from one type of energy to another • State the law of conservation of energy • Identify the source of energy stored in fossil fuels • Explain how energy is converted when fossil fuels are used • Describe the difference and changes between kinetic and potential energy • Define and calculate power • Compare energy and power
Content (Subject Matter)	<ul style="list-style-type: none"> • Energy • Work • Kinetic energy = $\frac{1}{2} mv^2$ • Potential energy • Elastic potential energy • Gravitational potential energy = mgh = weight x height • Mechanical energy • Thermal energy • Chemical energy • Electrical energy • Electromagnetic energy • Nuclear energy • Energy conversion • Law of conservation of energy • Fossil fuels • Potential chemical energy • Power = work/time = force x distance/time • Watt

	<ul style="list-style-type: none"> • Horsepower
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.12.D.1: Model the relationship between the height of an object and its potential energy. • 5.2.12.D.3: Describe the products and potential applications of fission and fusion reactions. • 5.2.12.D.4: Measure quantitatively the energy transferred between objects during a collision.
Materials and Resources	<ul style="list-style-type: none"> • Variety of different types of balls • Internet enabled computers for Fundercoaster lab
Notes	

Grade: 11 Subject: Integrated Science II	Unit 12: Thermal Energy and Heat
Big Idea/Rationale	<ul style="list-style-type: none"> • Temperature and thermal energy • The Nature of Heat • Thermal energy and States of matter • Uses of Heat
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Define temperature and identify the three temp scales • Describe the nature of heat
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Define temperature and identify the three common temperature scales • Contrast temperature and thermal energy • Describe how heat is related to thermal energy • Identify the three forms of heat transfer • Define and calculate the specific heat of a substance • Describe the movement of heat and how insulators and conductors affect heat transfer • Name the three states of matter and explain what causes matter to change states • Relate expansion of matter to addition of thermal energy • Describe what takes place in solid-liquid and liquid-gas changes of state • Describe how engines convert thermal energy to mechanical energy • Describe how refrigerators transfer thermal energy from a cool area to a warm area
Content (Subject Matter)	<ul style="list-style-type: none"> • Temperature • Thermal energy • Temperature scales <ul style="list-style-type: none"> ○ Fahrenheit scale ○ Celsius scale ○ Kelvin scale • Absolute zero • Heat • Ways of heat transfer <ul style="list-style-type: none"> ○ Convection ○ Conduction ○ Radiation • Convection current • Conductor • Insulator • Specific heat • Change in energy = mass x specific heat x change in temperature

	<ul style="list-style-type: none"> • States of matter • Solid • Liquid • Gas • Melting • Melting point • Freezing • Freezing point • Boiling • Boiling point • Vaporization • Evaporation • Change of state • Thermal expansion • Thermostats • Bimetallic strips • Combustion • Heat engines • External combustion engine • Refrigerator
Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none"> • 5.2.12.D.2: Describe the potential commercial applications of exothermic and endothermic reactions.
Materials and Resources	<ul style="list-style-type: none"> • Digital/Analog Thermometers • Can Calorimeters
Notes	

Grade: 11 Subject: Integrated Science II	Unit 13: Magnetism, Electromagnetism, Electric Charges and Current
Big Idea/Rationale	<ul style="list-style-type: none"> • The Nature of Magnetism • Earth’s Magnetic field • Electric Current and Magnetic Fields • Electromagnets • Electric Charge and Static Electricity • Ohm’s Law • Series and Parallel Circuits
Enduring Understanding (Mastery Objective)	<ul style="list-style-type: none"> • Describe the interaction of like and unlike electric charges • Define and describe static electricity and state how it differs from electric current • Define magnetic poles and describe the interaction between like and unlike magnetic poles • Define magnetic fields and describe magnetic field lines • Define magnetic domain and state how magnetic domains are lined up in magnetized material • Describe the relationship between electric current and a magnetic field • Describe how electrical energy can be converted into mechanical energy
Essential Questions (Instructional Objective)	<ul style="list-style-type: none"> • Define magnetic poles and describe the interactions between like and unlike poles • Define magnetic fields and describe magnetic field lines • Identify the magnetic properties of Earth and compare the magnetic and geographic poles • Describe the relationship between electric current and a magnetic field • Identify characteristics and cite uses of an electromagnet • Describe the interaction of like and unlike charges • Define and describe static electricity and state how it differs from electric current • Describe lightning and other forms of static discharge • Explain what causes the flow of electric current in terms of electric potential, potential difference, and voltage • Describe the relationship between voltage and the flow of electric current • Define resistance and state how it affects the flow of current • Calculate resistance using Ohm’s Law • Describe and construct a series circuit • Describe and construct a parallel circuit
Content (Subject Matter)	<ul style="list-style-type: none"> • Magnet • Magnetism

- Magnetic pole
- Magnetic field
- Magnetic field lines
- Magnetic domain
- Ferromagnetic material
- Breaking magnets
- Permanent magnet
- Magnetic declination Magnetosphere
- Solar wind
- Van Allen belts
- Electric current
- Electric field
- Electric circuit
- Conductor
- Insulator
- Resistor
- Resistance
- Solenoid
- Electromagnet
- Electric charge
- Electric field
- Static electricity
- Friction
- Conduction
- Induction
- Conservation of charge
- Static discharge
- Electroscope
- Electrical potential
- Potential difference
- Voltage
- Voltage source
- Resistance
- Ohm's law
- Volt
- Ohm
- Amp
- Voltmeter
- Ammeter
- Series circuit
- Parallel circuits

Skills/ Benchmarks (CCSS Standards)	<ul style="list-style-type: none">• 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
Materials and Resources	<ul style="list-style-type: none">• Snap Circuit Kits
Notes	