

HUDSONVILLE MIDDLE SCHOOL COURSE FRAMEWORK



COURSE/SUBJECT

8th Grade Science



<p>UNIT PACING Names of units and approximate pacing</p>	<p>UNIT LEARNING TARGETS By the end of the unit, students will be able to...</p>	<p>STANDARD Which standards (i.e. common core, MMC, etc.) does this address?</p>
<p>Science Process, QPOE2, and Metric Measurement <i>September 8 - October 22 (6 weeks)</i></p>	<p>I can... identify a testable question. apply a scientific process to solve a problem. design and conduct an experiment. accurately use scientific tools and equipment. collect and organize data. determine relationships and patterns in data.</p>	<p><u>Science Processes ~ Inquiry Process</u> S.IP.11 Generate scientific questions based on observations, investigations, and research. S.IP.12 Design and conduct scientific investigations. S.IP.13 Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes) appropriate to scientific investigations. S.IP.14 Use metric measurement devices in an investigation. S.IP.15 Construct charts and graphs from data and observations. S.IP.16 Identify patterns in data.</p>
	<p>I can... determine relationships and patterns in data. justify a conclusion with data/evidence. evaluate a scientific claim to determine if it is reasonable.</p>	<p><u>Science Processes ~ Inquiry Analysis and Communication</u> S.IA.11 Analyze information from data tables and graphs to answer scientific questions. S.IA.12 Evaluate data, claims, and personal knowledge through collaborative science discourse. S.IA.13 Communicate and defend findings of observations and investigations using evidence. S.IA.14 Draw conclusions from sets of data from multiple trials of a scientific investigation. S.IA.15 Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.</p>
	<p>I can... evaluate a scientific claim to determine if it is reasonable.</p>	<p><u>Science Processes ~ Reflection and Social Implications</u> S.RS.11 Evaluate the strengths and weaknesses of claims, arguments, and data.</p>

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Chemistry ~ Molecules in Motion <i>October 23 - November 18 (4 weeks)</i>	I can... describe conduction in terms of molecules bumping into each other to transfer energy. explain why conduction occurs better in one state of matter than another. describe the motion and arrangement of molecules in different states of matter. identify the difference between an element, compound, or mixture when looking at a drawing or formula. recognize that the properties of a compound are different from those of its individual elements.	<u>Forms of Energy</u> C2.2A Describe conduction in terms of molecules bumping into each other to transfer energy. Explain why there is better conduction in solids and liquids than gases. C2.2B Describe the various states of matter in terms of the motion and arrangement of the molecules making up the substance.
	I can... describe how heat is conducted in a solid. describe motion and arrangement of molecules as a substance changes from a solid to a liquid. describe the arrangement and motion of molecules as the amount of energy changes in each state of matter. explain the need to add energy in melting or boiling a substance. explain the release of energy during condensation and freezing. describe Conservation of Energy. explain that the amount of energy to heat a substance is equal to the amount released when a substance returns to its original temperature.	<u>Energy Transfer and Conservation</u> C3.3A Describe how heat is conducted in a solid. C3.3B Describe melting on a molecular level.
	I can... recognize that solids have stronger attractive forces than liquids or gases.	<u>Properties of Matter</u> C4.3A Recognize that substances have stronger attractive forces as they move from a gas to a solid. C4.3B Recognize that solids have a more ordered, regular arrangement of their particles than liquids and that liquids are more ordered than gases.

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	I can... separate mixtures based on the different physical properties of the individual components.	<u>Changes in Matter</u> C5.4B Measure, plot, and interpret the graph of the temperature versus time of an ice-water mixture, under slow heating, through melting and boiling.
Chemistry ~ Atomic Structure and Periodic Table <i>November 19 - December 18 (4 weeks)</i>	I can... find the number of valence electrons an element has. explain what a stable electron configuration is. identify the charges of each subatomic particle. find the oxidation number (ion charge) of an atom. identify a polyatomic ion in a chemical formula. find the oxidation number (ion charge) of a polyatomic ion. write a chemical formula when given two elements.	<u>Properties of Matter</u> C4.8A Identify the location, relative mass, and charge for electrons, protons, and neutrons. C4.8B Describe the atom as mostly empty space with an extremely small, dense nucleus consisting of the protons and neutrons and an electron cloud surrounding the nucleus. C4.8C Recognize that protons repel each other and that a strong force needs to be present to keep the nucleus intact. C4.8D Give the number of electrons and protons present if the fluoride ion has a -1 charge.
	I can... find metals and non-metals on the Periodic Table.	<u>Properties of Matter</u> C4.9A Identify elements with similar chemical and physical properties using the periodic table. C4.10A List the number of protons, neutrons, and electrons for any given ion or isotope.
Chemistry ~ Chemical Bonding and Chemical Changes <i>January 4 - February 5 (4 weeks)</i>	I can... identify an ionic bond when given a chemical formula.	<u>Properties of Matter</u> C4.2A Name simple binary compounds using their formula. C4.2B Given the name, write the formula of simple binary compounds.
	I can... identify a covalent bond when given a chemical formula.	<u>Changes in Matter</u> C5.5A Predict if the bonding between two atoms of different elements will be primarily ionic or covalent. C5.5B Predict the formula for binary compounds of main group elements.

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	<p>I can... recognize if a chemical reaction is endothermic or exothermic based on my observations and by examining the chemical equation.</p> <p>explain that reactions are endothermic or exothermic based on the forming or breaking of their bonds.</p>	<p><u>Energy Transfer and Conservation</u></p> <p>C3.4A Use the terms endothermic and exothermic correctly to describe chemical reactions in the laboratory.</p> <p>C3.4B Explain why chemical reactions will either release or absorb energy.</p>
	<p>I can... identify an ionic bond when given a chemical formula.</p> <p>identify a covalent bond when given a chemical formula.</p> <p>write the chemical name of a compound from its chemical formula.</p> <p>write a chemical formula of a compound from the chemical name.</p> <p>count the number of atoms found in a chemical formula.</p> <p>explain the difference between a chemical formula and a chemical equation.</p> <p>explain the difference between a subscript and a coefficient.</p> <p>balance chemical equations.</p> <p>write a chemical formula when given two elements.</p> <p>identify a polyatomic ion in a chemical formula.</p> <p>write a chemical formula given an element and a polyatomic ion.</p>	<p><u>Changes in Matter</u></p> <p>C5.2A Balance simple chemical equations applying the conservation of matter.</p> <p>C5.2B Distinguish between chemical and physical changes in terms of the properties of the reactants and products.</p> <p>C5.2C Draw pictures to distinguish the relationships between atoms in physical and chemical changes.</p>

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Chemistry ~ Acids and Bases/Fission and Fusion <i>February 5 - March 4 (4 weeks)</i>	I can... describe where acids and base are located on the pH scale. describe test to tell if something is an acid or base. predict the products when an acid is added to a base. explain effects acid rain has on lakes with different types of rock bottoms.	<u>Changes in Matter</u> C5.7B Predict products of an acid-based neutralization. C5.7C Describe test that can be used to distinguish an acid from a base. C5.7D Classify various solutions as acidic or basic, given their pH. C5.7E Explain why lakes with limestone or calcium carbonate experience less adverse effects from acid rain than lakes with granite beds.
	I can... explain what type of reaction is powering the sun. describe the difference between fission and fusion.	<u>Properties of Matter</u> P4.12C Explain how stars, including our Sun, produce huge amounts of energy (e.g., visible, infrared, ultraviolet light).

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Physics ~ Force and Motion <i>March 4- May 2 (8 weeks)</i>	<p>I can...</p> <p>calculate the average speed of an object knowing the distance and time.</p> <p>show velocities for linear motion.</p> <p>show velocities of circular motion.</p> <p>create line graphs using distance and time.</p> <p>describe and analyze the motion that a position-time graph represents.</p> <p>tell the difference between the variables: distance, displacement, speed, velocity, and acceleration.</p> <p>use the change in speed and the time it takes an object to travel a distance to calculate the average acceleration.</p> <p>given a graph, describe and analyze the motion that a velocity-time graph represents.</p> <p>explain why uniform circular motion involves acceleration without a change in speed.</p>	<p><u>Motion of Objects</u></p> <p>P2.1 Position -- Time</p> <p>P2.1A Calculate the average speed of an object using the change of position and elapsed time.</p> <p>P2.1B Represent the velocities for linear and circular motion using motion diagrams (arrows on strobe pictures).</p> <p>P2.1C Create line graphs using measured values of position and elapsed time.</p> <p>P2.1D Describe and analyze the motion that a position-time graph represents, given the graph.</p> <p>P2.1E Describe and classify various motions in a plane as one dimensional, two dimensional, circular, or periodic.</p> <p>P2.2 Velocity -- Time</p> <p>P2.2A Distinguish between the variables of distance, displacement, speed, velocity, and acceleration.</p> <p>P2.2B Use the change of speed and elapsed time to calculate the average acceleration for linear motion.</p> <p>P2.2C Describe and analyze the motion that a velocity-time graph represents, given the graph.</p> <p>P2.2D State that uniform circular motion involves acceleration without a change in speed.</p>

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	<p>I can...</p> <p>identify the forces acting between objects in “direct contact” or at a distance.</p> <p>identify the magnitude and direction of everyday forces.</p> <p>compare work done in different situations.</p> <p>calculate the net force acting on an object.</p> <p>identify the action and reaction forces from examples of everyday situations.</p> <p>predict the changes in motion of an object acted on by several forces.</p> <p>identify forces acting on objects moving with constant velocity.</p> <p>solve problems involving force, mass, and acceleration.</p> <p>identify the forces acting on objects moving with uniform circular motion.</p> <p>explain earth-moon interactions (orbital motion) in terms of forces.</p> <p>predict how the gravitational force between objects changes when the distance between them changes.</p> <p>explain how your weight on Earth could be different from your weight on other planets.</p>	<p><u>Forces and Motion</u></p> <p>P3.1 Basic Forces in Nature P3.1A Identify the force(s) acting between objects in “direct contact” or at a distance.</p> <p>P3.2 Net Forces P3.2A Identify the magnitude and direction of everyday forces (e.g., wind, tension in ropes, pushes and pulls, weight). P3.2C Calculate the net force acting on an object.</p> <p>P3.3 Newton’s Third Law P3.3A Identify the action and reaction force from examples of forces in everyday situations(e.g., book on a table, walking across the floor, pushing open a door).</p> <p>P3.4 Forces and Acceleration P3.4A Predict the changes in motion of an object acted on by several forces. P3.4B Identify forces acting on objects moving with constant velocity (e.g., cars on a highway). P3.4C Solve problems involving force, mass, and acceleration in linear motion (Newton’s Third Law). P3.4D Identify the force(s) acting on objects moving with uniform circular motion (e.g., car on a circular track, satellites in orbit).</p> <p>P3.6 Gravitational Interactions P3.6B Predict how the gravitational force between objects changes when the distance between them changes. P3.6C Explain how your weight on Earth could be different from your weight on other planets.</p>

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<p>Physics ~ Energy and Waves</p> <p><i>May 3 - June 8 (5 weeks)</i></p>	<p>I can...</p> <p>describe how to measure the wavelength of a sound wave.</p> <p>describe how to measure the amplitude of a sound wave.</p> <p>describe how to measure the frequency of a sound wave.</p> <p>describe how to measure the speed of a sound wave.</p> <p>identify everyday examples of energy transfer by waves and their sources.</p> <p>explain why a fishing bobber does not move forward as a wave passes under it.</p> <p>show that sound is energy transferred by a wave, not particles.</p> <p>explain how waves start from a vibration.</p> <p>explain why the intensity of sound decreases as the distance increases.</p> <p>explain why everyone in a classroom can hear one person speaking.</p> <p>describe the best place to put speakers in a large auditorium.</p> <p>identify the different regions on the electromagnetic spectrum.</p> <p>compare the wavelength of different electromagnetic waves.</p> <p>compare the frequency of different electromagnetic waves.</p> <p>compare the energy of different electromagnetic waves.</p> <p>explain why radio waves can travel through space and sound can not.</p>	<p><u>Forms of Energy and Energy Transformations</u></p> <p>P4.3 Kinetic and Potential Energy</p> <p>P4.3A Identify the form of energy in given situations (e.g., moving objects, stretched springs, rocks on a cliff, energy in food).</p> <p>P4.3B Describe the transformation between potential and kinetic energy in a simple mechanical system (e.g., pendulums, roller coasters, ski lifts).</p> <p>P4.3C Explain why all mechanical systems require an external energy source to maintain their motion.</p> <p>P4.4 Wave Characteristics</p> <p>P4.4A Describe specific mechanical waves (e.g., on a demonstration spring, on the ocean) in terms of wavelength, amplitude, frequency, and speed.</p> <p>P4.4B Identify everyday examples of transverse and compression (longitudinal) waves.</p> <p>P4.4C Compare and contrast transverse and compression (longitudinal) waves in terms of wavelength, amplitude, and frequency.</p> <p>P4.5 Mechanical Wave Propagation</p> <p>P4.5A Identify everyday examples of energy transfer by the waves and their sources.</p> <p>P4.5B Explain why an object (e.g., fishing bobber) does not move forward as a wave passes under it.</p> <p>P4.5C Provide evidence to support the claim that sound is energy transferred by a wave, not energy transferred by particles.</p> <p>P4.5D Explain how waves propagate from vibrating sources and why the intensity decreases with the square of the distance from a point source.</p> <p>P4.5E Explain why everyone in a classroom can hear one person speaking, but why an amplification systems is often used in the rear of a large concert auditorium.</p>

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	<p>I can... explain why there is a delay between the time we send a radio message to astronauts and when they receive it.</p> <p>explain why we see a batter swinging a bat before we hear the ball hitting it.</p>	<p>P4.6 Electromagnetic Waves P4.6A Identify the different regions on the electromagnetic spectrum and compare them in terms of wavelength, frequency, and energy.</p> <p>P4.6B Explain why radio waves can travel through space, but sound waves cannot.</p> <p>P4.6C Explain why there is a delay between the time we send a radio message to astronauts on the moon and when they receive it.</p> <p>P4.6D Explain why we see a distant event we hear it (e.g., lightning before thunder, exploding fireworks before the boom).</p> <p>P4.8 Wave Behavior -- Reflection and Refraction P4.8A Draw ray diagrams to indicate how light reflects off objects or refracts into transparent media.</p> <p>P4.8B Predict the path of reflected light from flat, curved, or rough surfaces (e.g., flat and curved mirrors, painted walls, paper).</p> <p>P4.9 Nature of Light P4.9A Identify the principle involved when you see a transparent object (e.g., straw, piece of glass) in a clear liquid.</p> <p>P4.9B Explain how various materials reflect, absorb, or transmit light in different ways.</p> <p>P4.9C Explain why the image of the sun appears reddish at sunrise and sunset.</p>