Science

HS Grade 9 (IPC) Essential Standards

Essential Standards: What we expect students to learn...										
Grade:	**9th**	**Subject**	**IPC**	**Semester**	**1 & 2**	**Team Members**	Jim Christian Scotty Stalp Addie Johansen			
ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.			**Explain how an earthquake happens and how it can result in a Tsunami. Be sure to include:** □ Two types of tectonic plates and their role in generating a tsunami □ Types of tectonic plate boundaries (hint – only make it relevant to the Japan tsunami) □ Formation and movement of a tsunami wave		❑ Layers of Earth	Earth's Structure Quiz	Tsunami Unit: September	
PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).			**Draw and explain the process of mantle convection and how it results in the movement of the Earth's tectonic plates. <u>Be sure to include:</u>** □ Energy types and energy transfer □ The relationship between energy and density □ How energy transfers and density changes in the <u>mantle</u> influence plate motion in the <u>crust</u>		❑ Types of Energy ❑ Density	Tsunami Final Assessment & Final Poster Model	Tsunami Unit: September/ October	

PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy.	❑ Include Nuclear Decay Process.		Tsunami Final Assessment	Tsunami Unit: September/ October	
LS 4-4 Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	❑ Describe the process of natural selection and how organisms are suited to a unique environment due to advantageous qualities.		Natural Selection Quiz	Disappearing Body Unit: November	❑ Can explain and apply concepts to other species.
PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction			Disappearing Body Final	Disappearing Body Unit: November/December	
PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	❑ Describe the structure of an atom and how it relates to forming bonds with other atoms ❑ Uses knowledge of periodic table to predict ionic or covalent bonding ❑ Be able to describe why a molecule has its particular structure based off the Periodic Table and valence electrons	❑ Components of an atom. ❑ Basic knowledge of periodic table.	Disappearing Body Final	Disappearing Body Unit: November/December	❑ Can draw a Lewis Dot Structure for a molecule to model ionic and covalent bonding ❑ Uses GREAT detail and makes connections between class content and the world we live in through the use of examples
PS1-2 Construct and revise an explanation for the	❑ Identifies the role energy plays in physical & chemical changes	❑ Physical vs. chemical changes. ❑ Types of energy.	Disappearing Body Final	Disappearing Body Unit: November/December	❑ Balance a chemical equation

outcomes of simple chemical reactions based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	❑ Can explain the chemical reaction that created the sulfuric acid and hydrogen gas ❑ Clearly diagram different interactions of matter (melting, dissolving, chemical reactions)				❑ Can make a prediction and write a chemical equation to describe how the protein reacts with the hot sulfuric acid ❑ Uses GREAT detail and makes connections between class content and the world we live in through the use of examples
PS1-4 A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy in order to take the molecule apart.			Photosynthesis Final	Hydroponics Unit: January	
PS1-5 Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy.	□ Identify, differentiate, and explain inputs and outputs of MATTER and ENERGY in photosynthesis □ Apply knowledge of photosynthesis as a chemical reaction to real-life scenarios		Photosynthesis Final	Hydroponics Unit: January	□ Explain WHY certain types of light energy results in a bigger & healthier plant □ Discuss energy transfers & transformations within photosynthesis
LS1-5 The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.	❑ Explain in detail the light dependent and light independent reactions. ❑ Show specifics of energy and matter flow.		Photosynthesis Final	Hydroponics Unit: Photosynthesis Final Exam: February	

ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.	□ Design change and trade-offs are given □ Use science to justify whether Biolite is bringing "Energy Everywhere"		Biolite Final & Engineering Project	Biolite Unit February	□ Thoughtful design change and trade-offs are described in detail, including quantitative data.
PS3-1: Create a computational model to calculate the change in energy of one component in a system when the change in energy of another component(s) and energy flows in and out of a system is known.	□ Show how energy is conserved and not "lost" □ Uses quantitative data to model flow of energy in a system including initial energies, flows in and out of the system, and final energies		Biolite Final	Biolite Unit February/March	□ Show computations of energy change from one component of a system to another □ Clearly explain the energy flow into and out of a defined system
PS3-2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).			Biolite Final	Biolite Unit March	
HS-PS4-5: Communicate technical information about how some technological devices use the principles of wave behavior and wave	❑ Use the principles of wave behavior to explain how information is	❑ What electromagnetic spectrum is and high vs. low energy.	Snapchat Final	Snapchat Unit April	❑ Includes in depth discussion on the specifics of:

interactions with matter to transmit and capture information and energy.	transmitted quickly over long distances ❏ Explains how information can be digitized				-Digital picture capture -Wave modulation -Digitization -Demodulation
HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	❏ Can calculate wave speed, wavelength, or frequency of a wave, when given the other quantities ❏ Shows the mathematical relationship between frequency, wavelength, and speed of waves	❏ Basic wave properties.	Snapchat Wave Quiz	Snapchat Unit April / May	❏ Explain why light waves travel at different speeds in different media (ex. air, water, steel, earth)
HS-PS4-2: Evaluate questions about the advantages of using digital transmission and storage of information.			Snapchat Final	Snapchat Unit April / May	
PS2-1 Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.		-Gravity -Basic understanding of velocity and acceleration. -Types of energy. -Basic math skills of solving for a variable.	Colliding Galaxies Final	Colliding Galaxies May/June	
PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.			Colliding Galaxies Final	Colliding Galaxies May/June	
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ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.					