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JC Schools Physical Science Yearly Science Standards

	Overarching Standards
	9-12.ETS1.A.1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants **9-12.ETS1.A.2** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering **9-12.ETS1.B.1** 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 **9-12.ETS1.B.2** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem
Units	**Priority Standards**
Unit 0 How to be a scientist	**9-12.PS4.A.1** **USE** mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media **9-12.ETS1.B.1** **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 **9-12.PS1.A.2**

	CONSTRUCT and REVISE an explanation for the products of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table and knowledge of the patterns of chemical properties **9-12.ETS1.B2** **USE** a computer simulation to model the impact of proposed solutions to a complex real world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem **9-12.PS3.A.1** **CREATE** a computational model to calculate the change in the energy of one component is a system when the changes in energy are known. **9-12.ETS1.B.1** **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
Unit 1 Structures of Matter	**9-12.PS1.A.1** **USE** the organization of the periodic table to **PREDICT** the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms
Unit 2 Nuclear Processes	**9-12.PS1.C.1** **USE** symbolic representations to **ILLUSTRATE** the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay
Unit 3	**9-12.PS1.A.3** **PLAN** and **CONDUCT** an investigation to gather evidence to compare physical and chemical properties of substances such as melting point, boiling point, vapor pressure, surface tension, and chemical reactivity to **INFER** the relative strength of attractive forces between particles

Unit 4 Chemical Interactions	**9-12.PS1.A.2** **CONSTRUCT** and **REVISE** an explanation for the products of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties **9-12.PS1.A.5** **DEVELOP** a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy **9-12.PS1.B.1** **APPLY** scientific principles and evidence to **PROVIDE** an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs **9-12.PS1.B.2** **REFINE** the design of a chemical system by specifying a change in conditions that would alter the amount Jan 30of products at equilibrium **9-12.PS1.B.3** **USE** symbolic representations and mathematical calculations to **SUPPORT** the claim that atoms, and therefore mass, are conserved during a chemical reaction
Unit 5 Forces and Interactions	**9-12 PS2.A.1** **ANALYZE** data to **SUPPORT** and **VERIFY** the concepts expressed by Newton's 2nd Law of motion, as it describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration **9-12.PS2.A.2** **USE** mathematical representations to **SUPPORT** and **VERIFY** the concepts that the total momentum of a system of objects is conserved when there is no net force on the system **9-12.PS2.A.3** **APPLY** scientific principles of motion and momentum to **DESIGN**, **EVALUATE**, and **REFINE** a device that minimizes the force on a macroscopic object during a collision **9-12.PS2.B.1** **USE** mathematical representations of Newton's Law of Gravitation to **DESCRIBE** and **PREDICT** the gravitational forces between objects

	9-12.PS2.B.2 **PLAN and CONDUCT** an investigation to provide evidence that an electric current can produce a magnetic field and that changing magnetic field can produce an electric current
Unit 6 Energy	**9-12.PS3.A.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 position of particles (objects) **9-12.PS3.A.3** **DESIGN**, **BUILD** and **REFINE** a device that works within given constraints to convert one form of energy into another form of energy **9-12.PS3.A.1** **CREATE** a computational model to **CALCULATE** the change in the energy of one component in a system when the changes in energy are known **9-12.PS3.B.1** **PLAN** and **CONDUCT** an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics) **9-12.PS3.C.1** **DEVELOP** and **USE** a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to interaction
Unit 7 Waves and Electromagnetic Radiation	**9-12.PS4.A.1** **USE** mathematical representations to **SUPPORT** a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media **9-12.PS4.A.2** **EVALUATE** the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model and that for some situations one model is more useful than the other **9-12.PS4.B.1** **COMMUNICATE** technical information about how electromagnetic radiation interacts with matter **9-12.PS4.B.2**

	EVALUATE the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter