Integrated Physical Science

(organized in order of Washington State Science Standards, not chronologically)

Content	State Standards	Power Standard	Learning Targets	Vocabulary
Scientific Method	9-11 INQA-F	I can create and conduct an independent investigation.	I can write a hypothesis based on a testable question. I can write a procedure for a lab investigation. I can write a conclusion that includes supporting data.	Hypothesis Conclusion Empirical* Validity* Feedback* Integrity* Correlation* Confidence*
Kinematics	9-11 PS1A-B 9-12 APPD	I can describe how objects move.	I can define and calculate average velocity ($v= x_2-x_1/t_2-t_1$). I can define and calculate average acceleration ($a= v_2-v_1/t_2-t_1$). I can describe the difference between speed and velocity. I can explain how an object moving at constant speed can be accelerating due to a change in direction. I can analyze a position vs time graph and a velocity vs time graph.	Velocity* Accelerate* Average velocity* Average acceleration* Speed
Laws of Motion	9-11 PS1C-E	I can describe why objects move.	I can explain the movement of objects that are acted on by balanced and unbalanced forces (Newton's First Law of Motion). I can calculate the acceleration of an object, given the object's mass and the net force on the object, using Newton's Second Law of Motion (F=ma). I can describe with everyday examples that for every action there is an equal and opposite reaction (Newton's Third Law of Motion).	Balanced force Unbalanced force
Forces	9-11 PS1F-H	I can describe gravitational and electromagnetic forces.	I can describe the relationship between electricity and magnetism. I can demonstrate and explain that an electric current flowing in a wire will create a magnetic field. I can explain how the weight of an object can change	Electromagnetic force*

			while its mass remains constant. I can predict the relative gravitational forces between objects of differing masses and distances.	
Atomic Structure & Periodic Table	9-11PS2A-C, J	I can explain the composition and organization of matter.	I can describe the structure of an atom. I can draw and label a model of an atom given the atomic number and atomic mass number. I can describe how an atom gains or loses neutrons to become an isotope. I can predict an element's properties based on the periodic table.	Atom Element Atomic number* Atomic mass number* Electron* Proton* Neutron* Isotope* Compound
Chemical change Physical change Chemical Bonding	9-11 PS2D-E,G-I	I can explain how matter interacts.	I can explain the difference between physical and chemical change. I can explain why atoms bond to form compounds. I can describe how matter and energy are conserved in a chemical reaction. I can explain covalent and ionic bonds. I can predict how temperature, pressure and surface area alters the rate of chemical change. I can describe how an atom gains or loses a charge to become an ion.	Chemical reaction Chemical change Physical change Ion* Ionic bond* Covalent bond* Ionic crystal*
Solutions	9-11 PS2H	I can explain how matter behaves in a solution.	I can describe common solutions. I can define solute, solvent, and solution. I can predict how temperature, pressure and surface area alters the rate of physical change. I can describe the pH scale and identify acids & bases. I can predict how the concentration and/or pH of a solution can be changed.	Aqueous solution* Dissolving Melting Reacting
Energy Energy Transfer	9-11 PS3A-C	I can explain the Law of Conservation of Energy in terms of energy transfers and transformations.	I can describe and calculate kinetic energy ($E_k = \frac{1}{2}mv^2$). I can describe potential energy. I can describe how potential energy and kinetic energy	Energy Energy transfer Kinetic energy* Gravitational

			can be changed from one to another. I can describe that energy can't be created or destroyed, it just transforms into other forms of energy.	potential energy* Conservation of Matter & Energy*
Waves	9-11 PS3D-E	I can explain that light and sound are forms of energy that travel in waves.	I can identify the anatomy of a physical wave. I can describe the energy transfer in sound and water waves. I can describe how to change the pitch and volume of sound. I can explain light as a combination of magnetism and electricity. I can explain differences along the electromagnetic spectrum using wavelengths, frequencies, energy, uses and characteristics. I can explain the differences between sound and light waves (including form, what they travel through)	Transverse wave Longitudinal wave Crest Trough Wave frequency* Wave amplitude* Medium Electromagnetic wave* Electromagnetic spectrum*
Origin of the Universe Nuclear Reactions Matter & Energy	9-11 ES1A - B, PS2K	I can explain the Bang Theory and how energy is transferred throughout the universe.	I can describe the effects of gravity on the formation of planets, stars, and galaxies. I can explain the life cycle of a star. I can explain the difference between fusion and fission. I can cite scientific evidence that support the Big Bang Theory. I can explain how matter and energy on Earth comes from stars.	Fusion* Fission* Big Bang Theory
Global Climate	9-11 ES2A-C, ES3C-D	I can explain that climate differences result from uneven heating of the Earth's surface and how that has changed over time.	I can explain why it is warmer in the summer than it is in the winter in WA. I can explain how the tilt and rotation of the earth affects energy transfer from the sun. I can explain why the N and S poles are colder than the equator. I can explain how landforms affect the climate in	Energy transfer Climate* Global climate*

			different parts of Washington State I can describe the carbon cycle. I can describe factors that change climates over long periods of time and cite methods that scientists have found to gather information on ancient climates. I can describe how the chemical composition of the Earth's atmosphere has changed over time.	
Renewable and nonrenewable resources	9-11ES2D, LS2F	I can explain renewable and nonrenewable resources and the roles they will play in our future.	I can identify examples of renewable resources. I can identify examples of nonrenewable resources. I can explain sustainability. I can analyze a source of renewable and nonrenewable energy in WA State that is most promising for our future and support my choice. I can analyze the affect of my personal choices on the environment.	Sustainable development* Renewable energy Nonrenewable energy Fossil fuel*
Geology	9-11ES3A-B	I can explain the forces that shaped Washington's geography and topography.	I can describe isotopic and relative age dating in order to sequence geologic events. I can construct a timeline of geologic events in the Pacific NW. I can explain which Earth processes may have caused rock formations (e.g., erosion, deposition, and scraping of terrain by glaciers, floods, volcanic eruptions, and tsunami) in the PNW.	Erosion Deposition Tsunami Glacier

Action Verbs for Power Standards and Learning Targets:
Identify: Name or point out
Describe: Name or point out, and give details
Explain: Name or point out, give details; and give reasons
Analyze: Name or point out, give details, and give reasons for how the parts affect each other

Other action verbs (from 2009 Revised Science Standards glossary)
Apply: The skill of selecting and using information in new situations or problems.
Classify: To arrange in some sort of order by categories or groupings.
Communicate: Participate in the discourse of science. Communication includes but is not limited to discussions, journaling, and sharing the results of investigations effectively and clearly in both written and oral forms.

Compare: To examine two or more objects or events to establish similarities and differences.
Contrast: To examine two or more objects or events to establish differences.
Critique: A critical review of a specific topic, process or investigation.
Design: (Verb): The process of originating and developing a plan for a product, structure, system, or component to meet a human need or want.
Evaluate: To make judgments or appraisals based on collected data.
Examine: To use a scientific method of observation to explore, test, or inquire about a theory, hypothesis, inference, or conclusion.
Infer: To arrive at a decision or logical conclusion by reasoning from evidence.
Interpret: To present an explanation of an event or process.
Investigate: To plan and conduct an organized scientific study to answer a question.
Predict/Prediction: Extrapolation to a future event or process based on theory, investigative evidence, or experience.
Redesign: To create a new and improved solution to a problem after an earlier solution was tested and found to be lacking in some respects.
*Vocabulary defined in glossary of the 2009 Revised Science Standards