

Physical Science 9 Content Standards

Code	Tri	Unit	Benchmark	Book Section
Nature of Science				
91111	1	NS	Explain the implications of the assumption that the rules of the universe are the same everywhere and these rules can be discovered by careful and systematic investigation.	1
91112	1	NS	Understand that scientists conduct investigations for a variety of reasons, including: to discover new aspects of the natural world, to explain observed phenomena, to test the conclusions of prior investigations, or to test the predictions of current theories.	1
91113	1	NS	Explain how the traditions and norms of science define the bounds of professional scientific practice and reveal instances of scientific error or misconduct.	1
91114	1	NS	Explain how societal and scientific ethics impact research practices.	1
91115	1	NS	Identify sources of bias and explain how bias might influence the direction of research and the interpretation of data.	1
91333	1	NS	Describe how scientific investigations and engineering processes require multi-disciplinary contributions and efforts.	multiple
91342	1	NS	Determine and use appropriate safety procedures, tools, computers and measurement instruments in science and engineering contexts.	1
91331	1	NS	Describe how values and constraints affect science and engineering.	1
91121	1	SE	Formulate a testable hypothesis, design and conduct an experiment to test the hypothesis, analyze the data, consider alternative explanations and draw conclusions supported by evidence from the investigation.	1
91344	1	SE	Relate the reliability of data to consistency of results, identify sources of error, and suggest ways to improve data collection and analysis.	1
91345	1	DA	Demonstrate how unit consistency and dimensional analysis can guide the calculation of quantitative solutions and verification of results.	1
91332	1	SE	Communicate, justify and defend the procedures and results of a scientific inquiry or engineering design project using verbal, graphic, quantitative, virtual or written means.	1
Earth Science Systems				
93111	1	DPB	Compare and contrast the interaction of tectonic plates at convergent and divergent boundaries.	22.4
93112	1	DPB	Use modern earthquake data to explain how seismic activity is evidence for the process of subduction.	22.4/22.5
93113	1	DPB	Describe how the pattern of magnetic reversals and rock ages on both sides of a mid-ocean ridge provides evidence of sea-floor spreading.	22.4
93114	1	DPB	Explain how the rock record provides evidence for plate movement.	22.4
93115	1	DPB	Describe how experimental and observational evidence led to the theory of plate tectonics.	22.4

91122	1	DPB	Evaluate the explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the scientifically acceptable evidence, and suggesting alternative scientific explanations.	1
91123	1	DPB	Identify the critical assumptions and logic used in a line of reasoning to judge the validity of a claim.	1
91124	1	DPB	Use primary sources or scientific writings to identify and explain how different types of questions and their associated methodologies are used by scientists for investigations in different disciplines.	multiple
Foundations of Chemistry				
91116	1	AT	Describe how changes in scientific knowledge generally occur in incremental steps that include and build on earlier knowledge.	multiple
91117	1	AT	Explain how scientific and technological innovations –as well as new evidence– can challenge portions of, or entire accepted theories and models including, but not limited to: cell theory, atomic theory, theory of evolution, plate tectonic theory, germ theory of disease, and the big bang theory.	multiple
92111	1	AT	Describe the relative charges, masses, and locations of the protons, neutrons, and electrons in an atom of an element.	4.2
92112	1	AT	Describe how experimental evidence led Dalton, Rutherford, Thompson, Chadwick and Bohr to develop increasingly accurate models of the atom.	4.1
93321	1	AT	Describe how the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.	25
93331	1	AT	Explain how evidence, including the Doppler shift of light from distant stars and cosmic background radiation, is used to understand the composition, early history and expansion of the universe.	26.5
93332	1	AT	Explain how gravitational clumping leads to nuclear fusion, producing energy and the chemical elements of a star.	26.2/26.3
92113	2	PT	Explain the arrangement of the elements on the Periodic Table, including the relationships among elements in a given column or row.	5.2
92114	2	AT	Explain that isotopes of an element have different numbers of neutrons and that some are unstable and emit particles and/or radiation.	4.2
92121	2	CB	Describe the role of valence electrons in the formation of chemical bonds.	6
92122	2	CR	Explain how the rearrangement of atoms in a chemical reaction illustrates the law of conservation of mass.	7.1
92123	2	CR	Describe a chemical reaction using words and symbolic equations.	7.1
92124	2	CR	Relate exothermic and endothermic chemical reactions to temperature and energy changes.	7.3
Nature of Engineering				
91346	2		Analyze the strengths and limitations of physical, conceptual, mathematical and computer models used by scientists and engineers.	4.1/7
91211	2		Understand that engineering designs and products are often continually checked and critiqued for alternatives, risks, costs and benefits, so that subsequent designs are refined and improved.	refered f the the

91212	2	Recognize that risk analysis is used to determine the potential positive and negative consequences of using a new technology or design, including the evaluation of causes and effects of failures.	These standards will be covered in class through a review of engineering process and
91213	2	Explain and give examples of how, in the design of a device, engineers consider how it is to be manufactured, operated, maintained, replaced and disposed of.	
91221	2	Identify a problem and the associated constraints on possible design solutions.	
91222	2	Develop possible solutions to an engineering problem and evaluate them using conceptual, physical and mathematical models to determine the extent to which the solutions meet the design specifications.	
91341	2	Describe how technological problems and advances often create a demand for new scientific knowledge, improved mathematics and new technologies.	
Laws of Motion			
92221	3	Recognize that inertia is the property of an object that causes it to resist changes in motion.	12.2
92222	3	Explain and calculate the acceleration of an object subjected to a set of forces in one dimension ($F=ma$).	12.2
92223	3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.	12.3
92224	3	Use Newton's universal law of gravitation to describe and calculate the attraction between massive objects based on the distance between them.	12.4
voigh	Principles of Energy		
92321	3	Identify the energy forms and explain the transfers of energy involved in the operation of common devices.	15.1/15.2
92322	3	Calculate and explain the energy, work and power involved in energy transfers in a mechanical system.	14.1
92323	3	Describe how energy is transferred through sound waves and how pitch and loudness are related to wave properties of frequency and amplitude.	17.4
92324	3	Explain and calculate current, voltage and resistance, and describe energy transfers in simple electric circuits.	20
92325	3	Describe how an electric current produces a magnetic force, and how this interaction is used in motors and electromagnets to produce mechanical energy.	20
92326	3	Compare fission and fusion in terms of the reactants, the products and the conversion from matter into energy.	10
92327	3	Describe the properties and uses of forms of electromagnetic radiation from radio frequencies through gamma radiation.	18
92411	3	Compare local and global environmental and economic advantages and disadvantages of generating electricity using various sources or energy.	15.3
92412	3	Describe the trade-offs involved when technological developments impact the way we use energy, natural resources, or synthetic materials.	15.3

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