

Science - Physical Science

Idaho Department of Education Content Standards	Objective	Sub Objectives	Task Analysis	Essential Vocabulary
Cognitive level codes: • B: Memorize • C: Perform procedures • D: Demonstrate understanding • E: Conjecture, generalize, prove • F: Solve non-routine problems, make connections	Bloom's Equivalent • B = Knowledge • C = Comprehension • D = Comprehension • E = Application and Analysis • F = Synthesis			
The unifying concepts and processes standard can be the focus of instruction at any grade level but should always be closely linked to outcomes aligned with other content standards.				
Standard 1: Nature of Science				
Goal 1.1: Understand Systems, Order, and Organization	8-9.PS.1.1.1 Explain the scientific meaning of system, order, and organization. (648.01a) CL: E Content Limit: Students should be able to identify the components of a system and how the components interact to allow the system to function. Suitable systems to test include the structure of an electric motor, the Earth-Moon system, the solar system, the respiratory system, and the cell as a system		<ul style="list-style-type: none"> • Explain the meaning of system, order, and organization. • Identify the parts of a specific system and how they interact. (e.g. atoms, roller coasters, circuits, Newton's Laws) 	system • order • organization
	8-9.PS.1.1.2 Apply the concepts of order and organization to a given system. (648.01a) CL: E Content Limit: Students should be able to identify the components of a system and the role each component has in the system's function.		<ul style="list-style-type: none"> • Apply the concepts of order and organization to a given system 	
Goal 1.2: Understand Concepts and Processes of Evidence, Models, and Explanations	8-9.PS.1.2.1 Use observations and data as evidence on which to base scientific explanations. (648.02a) CL: E Content Limit: When presented observations and data (including different cell types, genetic traits, or environmental changes over time), students will be able to select the most reasonable explanation from a list of possibilities.		<ul style="list-style-type: none"> • State that explanations are based on observations, evidence and testing • Compare and contrast quantitative data with qualitative data • Recognize that science changes with additional data • Predict the most reasonable explanation for a set of observations and/or data. 	observation • data
	8-9.PS.1.2.2 Develop models to explain concepts or systems. (648.02b) CL: Content Limit: Assessed in the classroom, not on the ISAT		<ul style="list-style-type: none"> • Define model. • Recognize situations when scientists need to use models. • Explain how models can be used to represent concepts or systems that cannot be observed directly. • Apply the use of a scientific model in solving problems 	model

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	8-9.PS.1.2.3 Develop scientific explanations based on knowledge, logic, and analysis. (648.02c) CL: Content Limit: Assessed in the classroom, not on the ISAT		<ul style="list-style-type: none"> Show that explanations are based on observations, evidence and testing Using logic and analysis, predict the most reasonable explanation for a set of observations and/or data. 	
Goal 1.3: Understand Constancy, Change, and Measurement	8-9.PS.1.3.1 Measure changes that can occur in and among systems. (648.03b) CL: E Content Limit: Students should be able to explain changes that occur in systems. Topics may include heart rate, breathing rate, dilation of pupils, cells, ecosystems, biogeochemical cycles, and chemical reactions.		<ul style="list-style-type: none"> Explain and identify (explainify) changes that occur in a variety of systems. 	
	8-9.PS.1.3.2 Analyze changes that can occur in and among systems. (648.03b) CL: E Content Limit: Students should be able to analyze changes that take place in system performance due to external or environmental changes. Topics may include heart rate, breathing rate, and dilation of pupil changes.		<ul style="list-style-type: none"> Examine how internal and/or external changes affect the systems performance Analyze changes that can occur in and among systems 	internal • external
	8-9.PS.1.3.3 Measure and calculate using the metric system. (648.03c) CL: E Content Limit: Students should be able to use metric units to record and analyze data.		<ul style="list-style-type: none"> Identify the units of length, mass, volume, time and temperature of the metric system Use the appropriate tool when measuring using the metric system Convert between units within the metric system 	meters • liters • grams • Celsius • Kelvin • seconds • length • mass • volume • metric system
Goal 1.4: Understand the Theory that Evolution is a Process that Relates to the Gradual Changes in the Universe and of Equilibrium as a Physical State	No objectives in Physical Science.			
Goal 1.5: Understand Concepts of Form and Function	No objectives in Physical Science.			
Goal 1.6: Understand Scientific Inquiry and Develop Critical Thinking Skills	8-9.PS.1.6.1 Identify questions and concepts that guide scientific investigations. (649.01a) CL: E Content Limit: When presented a number of questions, students will be able to identify questions that can be investigated.		<ul style="list-style-type: none"> Examine a set of questions to determine which ones are valid for a given situation. 	scientific method

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	<p>8-9.PS.1.6.2 Utilize the components of scientific problem solving to design, conduct, and communicate results of investigations. (649.01b) CL: E Items should address experimental design.</p>		<ul style="list-style-type: none"> • Analyze a scientific experiment and point out the variables, procedure, and control • Identify dependent (responding) and independent (manipulated) variables • Design and carry out a controlled experiment given a specific problem or question • Form a data table, graph or chart to report the results of an experiment 	<p>hypothesis • dependent variable • control • independent variable • experiment</p>
	<p>8-9.PS.1.6.3 Use appropriate technology and mathematics to make investigations. (649.01c) CL: E Students should be able to identify suitable forms of technology and mathematics needed to solve a problem presented in the question stem.</p>		<ul style="list-style-type: none"> • Examine a set of tools and technologies to determine which should be used to investigate a given situation • Apply mathematics in interpreting scientific data 	<p>technology • laboratory equipment</p>
	<p>8-9.PS.1.6.4 Formulate scientific explanations and models using logic and evidence. (649.01d) CL: Content Limit: Assessed in the classroom, not on the ISAT</p>		<ul style="list-style-type: none"> • Formulate explanations that are based on observations, evidence and testing • Using logic and analysis, determine the most reasonable explanation for a set of observations and/or data. 	
	<p>8-9.PS.1.6.5 Analyze alternative explanations and models. (649.01e) CL: E Content Limit: When offered a variety of possible explanations, students should be able to identify the most logical option to fit with the question stem.</p>		<ul style="list-style-type: none"> • Analyze several possible explanations for a set of data and identify the most logical option. 	
	<p>8-9.PS.1.6.6 Communicate and defend a scientific argument. (649.01f) CL: E Content Limit: When offered a variety of possible explanations, students should be able to identify the option that will fit with the question stem.</p>		<ul style="list-style-type: none"> • Identify the argument • List supporting data • Defend the scientific argument 	
	<p>8-9.PS.1.6.7 Explain the differences among observations, hypotheses, and theories. (649.01g) CL: E Content Limit: Students should be able to distinguish between observations, hypotheses, and theories.</p>		<ul style="list-style-type: none"> • Define observation, hypothesis, and theory • Compare and contrast observation, hypothesis, and theory 	<p>hypothesis • theory • observation • law</p>
<p>Goal 1.7: Understand That Interpersonal Relationships Are Important in Scientific Endeavors</p>	<p>No objectives in Physical Science.</p>			

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Goal 1.8: Understand Technical Communication	8-9.PS.1.8.1 Analyze technical writing, graphs, charts, and diagrams. (658.02a) CL: E Content Limit: Students should be asked to derive information from graphs, charts, and diagrams.		<ul style="list-style-type: none"> Interpret and draw conclusions from technical writing, graphs, charts, and diagrams. 	
Standard 2: Physical Science				
Goal 2.1: Understand the Structure and Function of Matter and Molecules and Their Interactions	No objectives in Physical Science.			
Goal 2.2: Understand Concepts of Motion and Forces	8-9.PS.2.2.1 Explain motion using Newton's Laws of Motion. (650.04b) CL: E Content Limit: Items should cover the relationship between force, mass, and acceleration. Inertia, balanced and unbalanced forces, action and reaction should also be addressed.		<ul style="list-style-type: none"> Explain the difference between speed, velocity and acceleration Explain the difference between balanced and unbalanced forces State Newton's three laws Determine which of Newton's laws is demonstrated by a specific example Analyze specific examples of motion using Newton's three laws 	speed • velocity • acceleration • frame of reference • mass • inertia • force • distance • time • motion • friction
Goal 2.3: Understand the Total Energy in the Universe is Constant	8-9.PS.2.3.1 Explain that energy can be transformed but cannot be created nor destroyed. (650.05a) CL: D Content Limit: Items can address energy conversions including the impact of friction on the total amount of energy available.		<ul style="list-style-type: none"> Define the different types of energy Explain conservation of energy Identify and describe transformations of energy Examine and explain transformations of energy given specific examples 	law of conservation of energy • energy • mechanical energy • chemical energy • potential energy • kinetic energy • sound energy • thermal energy • light energy • electromagnetic energy • friction
	8-9.PS.2.3.2 Classify energy as potential and/or kinetic and as energy contained in a field. (650.05b) CL: C Content Limit: Items should be able to distinguish between different forms of potential and kinetic energy. The relationship between magnetic fields and electrical fields can be addressed. The structure or organization of the electromagnetic spectrum can also be addressed.		<ul style="list-style-type: none"> Define potential and kinetic energy Define a field Compare and contrast potential and kinetic energy in a system Explain the relationship between potential energy and a field 	field • system • electromagnetic spectrum • potential energy • kinetic energy

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Goal 2.4: Understand the Structure of Atoms	8-9.PS.2.4.1 Describe the properties, function, and location of protons, neutrons, and electrons. (650.01a) CL: D Content Limit: Items can address electrical charges, locations in the atom of each particle and relative mass of each particle. For an atom, students should know that the proton determines the element, the neutron determines the isotope, and the electron determines the chemical properties.	<ul style="list-style-type: none"> Describe the properties of protons, neutrons, and electrons Describe the functions of protons, neutrons, and electrons Describe the locations of protons, neutrons, and electrons 	<ul style="list-style-type: none"> Compare and contrast the masses and charges of protons, neutrons, and electrons Explain how electrons are involved in chemical bonding and properties of matter Explain how neutrons help stabilize the nucleus and determine isotopes Explain how protons determine the element Compare and contrast the locations of protons, neutrons, and electrons Describe the relative sizes of the nucleus and the electron cloud 	proton • neutron • electron • atomic mass unit • atom ionic bond • covalent bond • valence electrons • mass number • atomic mass • atomic number • molecule • ion • isotopes • average atomic mass electron cloud • nucleus
	8-9.PS.2.4.2 Explain the processes of fission and fusion. (650.01b) CL: D Content Limit: Both processes release energy. Fission results in small particles. Fusion results in larger particles.		<ul style="list-style-type: none"> Describe the process of fission Describe the process of fusion Compare and contrast the processes of fission and fusion 	fission • fusion
	8-9.PS.2.4.3 Describe the characteristics of isotopes. (650.01c) Content Limit: Items should address that isotopes are atoms of the same element that have a different number of neutrons.		<ul style="list-style-type: none"> Describe how isotopes of the same element differ in numbers of neutrons while protons and electrons remain constant Recognize that some isotopes are unstable (radioactive) and can undergo nuclear decay 	isotopes • nuclear decay • radioactivity
	8-9.PS.2.4.4 State the basic electrical properties of matter. (650.01d) CL: B Content Limit: Items should address that like charges repel and opposite charges attract, and that some forms of matter are insulators and others are conductors.		<ul style="list-style-type: none"> Explain how like charges repel and opposite charges attract Define conductor, insulator, and semiconductor Determine what properties make matter a conductor, insulator, or semiconductor Classify different materials as conductors, insulators, or semiconductors Explain how a neutral object develops a charge by induction or conduction 	electric charge • conductor • insulator • semiconductor • conduction • insulation • friction • induction
	8-9.PS.2.4.5 Describe the relationships between magnetism and electricity. CL: D Content Limit: Items should address how generators and motors work.		<ul style="list-style-type: none"> Describe how a changing electric field can be used to create a magnetic field Describe how a changing magnetic field can be used to create an electric field Compare and contrast electric motors and electric generators 	electric field • magnetic field • generator • motor
Goal 2.5: Understand Chemical Reactions	8-9.PS.2.5.1 Explain how chemical reactions may release or consume energy while the quantity of matter remains constant. (650.03a) CL: D Content Limit: Items should address the law of conservation of mass and exothermic and endothermic reactions.		<ul style="list-style-type: none"> Restate the law of conservation of mass Define exothermic reactions Define endothermic reactions Classify a reaction as exothermic or endothermic based upon given information 	endothermic • exothermic • law of conservation of mass

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Standard 3: Biology				
Goal 3.1: Understand the Theory of Biological Evolution	No goals or objectives in Physical Science			
Goal 3.2: Understand the Relationship between Matter and Energy in Living Systems	No goals or objectives in Physical Science			
Goal 3.3: Understand the Cell is the Basis of Form and Function for All Living Things	No goals or objectives in Physical Science			
Standard 4: Earth and Space Systems				
Goal 4.1: Understand Scientific Theories of Origin and Subsequent Changes in the Universe and Earth Systems	No goals or objectives in Physical Science.			
Goal 4.2: Understand Geo-chemical Cycles and Energy in the Earth System	No goals or objectives in Physical Science.			
Standard 5: Personal and Social Perspectives; Technology				
Goal 5.1: Understand Common Environmental Quality Issues, Both Natural and Human Induced	No goals or objectives in Physical Science.			
Goal 5.2: Understand the Relationship between Science and Technology	8-9.PS.5.2.1 Explain how science advances technology. (655.01a) CL: E Content Limit: Issues relevant to Idaho should be addressed: stream degradation, logging, mining, dams, and wind turbines.		• Examine the ways in which science advances technology	science • technology
	8-9.PS.5.2.2 Explain how technology advances science. (655.01a) CL: E Content Limit: Use scientists whose discoveries have significance and ramifications in today's world to frame items.		• Examine the ways in which technology advances science	
	8-9.PS.5.2.3 Explain how science and technology are pursued for different purposes. (656.01b) CL: D Content Limit: Topics like oil, metallic ores, and wood products are suitable for consideration.		• Compare and contrast the purposes of science and technology	
Goal 5.3: Understand the Importance of Natural Resources and the Need to Manage and Conserve Them	No objectives in Physical Science.			