



Alignment Document
State of Nebraska and Aventa Learning Physical Science

Physical Science
2005-2007 Benchmark Blueprint

| Goals | Standards | Benchmarks | Unit Name | Course Topic Description |
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| 12.1 Unifying concepts and processes help students think about and integrate a range of basic ideas which builds an understanding of the natural world. | 12.1.1 develop an understanding of systems, order, and organization. | 12.1.1.A Predict and evaluate how change within a system affects that system. | Doing Science | The Scientific Method |
| | | | Doing Science | Experimental Set Up |
| | | | Doing Science | Bouncing Ball Lab |
| | | | Motion | Newton's First Law of Motion |
| | | | Forces | Newton's Second Law of Motion |
| | | | Forces | Newton's Third Law |
| | | | Energy | Conservation of Energy |
| | | | Energy | Heat and Temperature |
| | | | Simple Machines | Bike Lab |
| | | | Matter | States of Matter |
| | | | Chemical Reactions | Energy and Chemical Reactions |
| | | | Chemical Reactions | Reaction Rate |
| Chemical Reactions | Equilibria | | | |

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| | | 12.1.1.B Design solutions to problems identified within a system | Doing Science Doing Science | The Scientific Method Experimental Set Up |
| 12.1.2 develop an understanding of evidence, models, and explanation. | | 12.1.2.A Create a physical, mental, or mathematical model to show how objects and processes are connected. | | |
| | | 12.1.2.B Test the usefulness of a model by comparing its predictions to actual observations. | | |
| | | 12.1.2.C Understand that the way data are displayed affects interpretation. | | |
| | | 12.1.2.D Evaluate the reasonableness of answers to problems. | Matter | Solving Quantitative Problems |
| | | 12.1.2.E Understand that larger well-chosen samples produce more accurate estimates of the characteristics of the total population. | | |
| | | 12.1.2.F Understand that a correlation between two variables doesn't mean that either one causes the other. | | |
| 12.1.3 develop an understanding of change, constancy, and measurement. | | 12.1.3.A Use powers of ten to represent large and small numbers. | Matter | Measurements in Chemistry |
| | | 12.1.3.B Compare data for two groups by using averages and ranges of values. | | |
| | | 12.1.3.C Understand that measurement errors may affect results of calculations. | Matter | Uncertainty in Measurement |
| | | 12.1.3.D Describe rate of change by comparing one measured quantity to another measured quantity. | Motion | Acceleration |
| | | 12.1.3.E Investigate and describe how different characteristics, properties, or relationships within a system change as their dimensions increase or decrease. | Matter | States of Matter |
| 12.1.4 develop an understanding of form and function. | | 12.1.4.A Explain function by referring to form and explain form by referring to function. | | |

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| | 12.1.5 develop an understanding of change over a period of time. | 12.1.5.A Identify the series of changes that occur in objects, organisms, and natural and human designed systems. | | |
| | | 12.1.5.B Explain how a system at equilibrium is affected by change. | Chemical Reactions | Equilibria |
| 12.2 Science as inquiry requires students to combine processes and scientific knowledge with scientific reasoning and critical thinking to develop their understanding of science. | 12.2.1 develop the abilities needed to do scientific inquiry. | 12.2.1.A Formulate questions and identify concepts that guide scientific investigations. | Doing Science | The Scientific Method |
| | | | Doing Science | Introductory Physical Science Lab |
| | | | Doing Science | Bouncing Ball Lab |
| | | | Motion | Inertia Lab |
| | | | Forces | Acceleration of Gravity Lab |
| | | | Simple Machines | Bike Lab |
| | | 12.2.1.B Design and conduct scientific investigations. | Doing Science | Introductory Physical Science Lab |
| | | | Doing Science | Bouncing Ball Lab |
| | | | Motion | Inertia Lab |
| | | | Forces | Acceleration of Gravity Lab |
| | | | Simple Machines | Bike Lab |
| | | 12.2.1.C Use technology and mathematics to improve investigations and communications. | | |
| | | 12.2.1.D Formulate and revise scientific explanations and models using logic and evidence. | Doing Science | The Scientific Method |
| | | | Doing Science | Introductory Physical Science Lab |
| | | | Doing Science | Bouncing Ball Lab |

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| | | | Motion | Inertia Lab |
| | | | Forces | Acceleration of Gravity Lab |
| | | | Simple Machines | Bike Lab |
| | | 12.2.1.E Recognize and analyze alternative explanations and models. | Doing Science | The Scientific Method |
| | | | Doing Science | Introductory Physical Science Lab |
| | | | Doing Science | Bouncing Ball Lab |
| | | | Motion | Inertia Lab |
| | | | Forces | Acceleration of Gravity Lab |
| | | | Simple Machines | Bike Lab |
| | | 12.2.1.F Communicate and defend a scientific argument. | Doing Science | Introductory Physical Science Lab |
| | | | Doing Science | Bouncing Ball Lab |
| | | | Motion | Inertia Lab |
| | | | Forces | Acceleration of Gravity Lab |
| | | | Simple Machines | Bike Lab |
| 12.3 Physical science focuses on science facts, concepts, principles, theories, and models that are important for all students to know, understand, and use. | 12.3.1 develop an understanding of the structure of the atom. | 2.3.1.A Investigate and describe the structure of atoms, focusing on properties of subatomic particles. | Atomic Structure and the Periodic Table | The Discovery of the Atom |
| | | | Atomic Structure and the Periodic Table | Atomic Model |
| | | 12.3.1.B Investigate and explain the types | | |

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| | | of nuclear reactions. | | |
| | | 12.3.1.C Investigate and describe the effect of electrical and nuclear forces which hold atoms together. | | |
| 12.3.2 develop an understanding of the structure and properties of matter. | | 12.3.2.A Investigate and understand that atoms interact with one another by transferring or sharing electrons. | Chemical Bonding | Bonding |
| | | | Chemical Bonding | Ionic Bonds |
| | | | Chemical Bonding | Covalent Bonds |
| | | | Chemical Bonding | Metallic Bonding |
| | | 12.3.2.B Investigate and explain the periodic table of elements in terms of repeating patterns of physical and chemical properties. | Atomic Structure and the Periodic Table | Development of the Modern Periodic Table |
| | | | Atomic Structure and the Periodic Table | The Structure of the Periodic Table |
| | | | Atomic Structure and the Periodic Table | Periodic Trends |
| | | 12.3.2.C Investigate and describe how the structure of an atom determines the chemical properties of an element. | Atomic Structure and the Periodic Table | Development of the Modern Periodic Table |
| | | | Atomic Structure and the Periodic Table | The Structure of the Periodic Table |
| | | | Atomic Structure and the Periodic Table | Periodic Trends |
| | | 12.3.2.D Investigate and explain how the interactions among the molecules of a compound determine its physical and | Chemical Bonding | Bond Types vs Properties |
| | | | Chemical Bonding | Molecular Shape |

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| | chemical properties. | Chemical Bonding | Intermolecular Forces |
| | 12.3.2.D Investigate and use changes in energy to explain the differences among the states of matter. | Matter | States of Matter |
| | 12.3.2.F Investigate and describe the bonding of carbon atoms in chains and rings to produce compounds essential to life. | | |
| 12.3.3 develop an understanding of chemical reactions. | 12.3.3.A Investigate and describe common chemical reactions. | Chemical Reactions | Types of Reactions |
| | 12.3.3.B Investigate and describe the change of energy as a result of chemical reactions. | Chemical Reactions | Energy and Chemical Reactions |
| | 12.3.3.C Investigate and describe how electrons are involved in bond formation during chemical reactions. | Chemical Bonding | Bonding |
| | | Chemical Bonding | Ionic Bonds |
| | | Chemical Bonding | Covalent Bonds |
| 12.3.3.D Investigate and describe the factors influencing the rates of chemical reactions, including catalysts. | Chemical Reactions | Reaction Rate | |
| 12.3.4 develop an understanding of motions and forces. | 12.3.4.A Investigate and understand the effect of forces on the motion of objects. | Motion | Newton's First Law of Motion |
| | | Forces | Newton's Second Law of Motion |
| | | Forces | Friction |
| | | Forces | Gravity |
| | | Forces | Projectile Motion |
| | | Forces | Newton's Third Law |
| | 12.3.4.B Investigate and understand | Forces | Gravity |

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| | | gravity as an attractive force that each mass exerts on any other mass. | | |
| | | 12.3.4.C Investigate and understand electrical force as a force that exists between any two charged objects. | Electricity & Magnetism | Static Electricity |
| | | 12.3.4.D Investigate and describe an electric field, a magnetic field, and the interaction between them. | Electricity & Magnetism Electricity & Magnetism Electricity & Magnetism | Static Electricity Magnetism Earth's Magnetic Poles |
| 12.3.5 develop an understanding of the conservation of energy and increase in disorder. | 12.3.5.A Understand that the total energy in the universe is constant and can never be destroyed. | Energy | Conservation of Energy | |
| | 12.3.5.B Investigate and distinguish between kinetic energy and potential energy. | Chemical Reactions | Energy and Chemical Reactions | |
| | 12.3.5.C Investigate and describe heat transfer in terms of conduction, convection, and radiation. | Energy | Potential Energy | |
| | 12.3.5.D Investigate and describe heat transfer in terms of conduction, convection, and radiation. | Energy | Kinetic Energy | |
| | 12.3.5.D Investigate and give examples of how systems tend to become more disorderly over time. | Energy | Heat and Temperature | |
| 12.3.6 develop an understanding of the interactions of energy and matter. | 12.3.6.A Investigate and understand that all waves possess and transfer energy. | Waves | Waves | |
| | 12.3.6.B Understand that electromagnetic waves result when a charged object accelerates. | Waves | Sound Waves | |
| | 12.3.6.C Investigate and illustrate how wavelength and frequency of waves are inversely related. | Atomic Structure and the Periodic Table | Electronic Structure | |
| | | Waves | Waves | |
| | | Atomic Structure and the Periodic Table | Electronic Structure | |

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| | | 12.3.6.D Investigate and understand that the energy of waves can be changed into other forms of energy, just as other forms of energy can be transformed into wave energy. | Waves Waves Waves | Waves Sound Waves Electromagnetic Radiation |
| | | 12.3.6.E Investigate and understand that atoms or molecules can be identified by spectral analysis. | Atomic Structure and the Periodic Table | Light as a Particle |
| | | 12.3.6.F Investigate and describe how the composition and temperature of a material affect electron flow. | Electricity & Magnetism Electricity & Magnetism | Conductors and Insulators Electrical Current |
| 12.6 An understanding of science and technology establishes connections between the natural and designed world, linking science and technology. | 12.6.1 develop an understanding of technological design. | 12.6.1.A Propose designs and choose between alternative solutions of a problem. | | |
| | | 12.6.1.B Implement the selected solution. | | |
| | | 12.6.1.C Evaluate the solution and its consequences. | | |
| | | 12.6.1.D Communicate the problem, process, and solution. | | |
| | 12.6.2 develop an understanding about science and technology. | 12.6.2.A Explain how science advances with the introduction of new technology. | | |
| | | 12.6.2.B Understand creativity, imagination, and a good knowledge base are all needed to advance the work of science and engineering. | | |
| | | 12.6.2.C Contrast the reasons for the pursuit of science and the pursuit of technology. | | |
| | | 12.6.2.D Contrast the reporting of scientific knowledge and the reporting of technical knowledge. | | |
| 12.7 A personal and social perspective of science helps a student to understand and act | 12.7.1 develop an understanding of personal and community health. | 12.7.1.A Investigate and describe the effect of nutritional balance on growth, development, and personal well-being. | | |

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| <p>on personal and social issues. This perspective builds a foundation for future decision making.</p> | | <p>12.7.1.B Investigate and explain how diseases are prevented, controlled, and cured.</p> | | |
| | | <p>12.7.1.C Investigate and explain how genetic traits affect a person's health.</p> | | |
| | | <p>12.7.1.D Investigate and analyze risks and benefits in making decisions about personal and community health.</p> | | |
| | <p>12.7.2 develop an understanding of the effects of population change.</p> | <p>12.7.2.A Investigate and identify causes of population growth or decline.</p> | | |
| | | <p>12.7.2.B Investigate and explain how various factors influence birth rates and death rates.</p> | | |
| | | <p>12.7.2.C Investigate and predict how population change may impact resource use and environments.</p> | | |
| | <p>12.7.3 develop an understanding of natural resources.</p> | <p>12.7.3.A Investigate and explain how human populations use environmental resources to maintain and improve their existence.</p> | | |
| | | <p>12.7.3.B Investigate and understand that the earth has renewable and finite resources.</p> | | |
| | | <p>12.7.3.C Investigate and understand the limitations of natural systems to renew and recycle resources.</p> | | |
| | <p>12.7.4 develop an understanding of environmental quality.</p> | <p>12.7.4.A Investigate and describe how the positive and negative consequences of human intervention or nonintervention impact the ecosystem.</p> | | |
| | | <p>12.7.4.B Investigate and explain factors which may influence environmental quality.</p> | | |
| | <p>12.7.5 develop an understanding of natural and human-induced hazards.</p> | <p>12.7.5.A Investigate and describe how human activities increase or reduce the potential for hazards.</p> | | |

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| | | 12.7.5.B Investigate and distinguish between slowly and rapidly occurring natural hazards and their impact on the environment. | | |
| | 12.7.6 develop an understanding of the role of science and technology in local, national, and global challenges. | 12.7.6.A Understand that knowledge of basic concepts about scientific and technological challenges should precede active debate. | | |
| | | 12.7.6.B Investigate and understand that social issues and challenges may affect advancements in science and technology. | | |
| | | 12.7.6.C Understand that science and technology are essential social enterprises that indicate what could happen, but not what should happen. | | |
| 12.8 The history and nature of science illustrates different aspects of scientific inquiry, the human aspects of science, and the role that science has played in the development of various cultures. | 12.8.1 develop an understanding of science as a human endeavor. | 12.8.1.A Demonstrate ethical scientific practices (e.g., informing research subjects about risks and benefits, humane treatment of animals, truthful reporting, public disclosure of work, and peer review). | | |
| | | 12.8.1.B Examine and understand the societal, cultural, and personal beliefs that influence scientists | | |
| | | 12.8.1.C Recognize science as one way of answering questions and explaining the natural world. | | |
| | 12.8.2 develop an understanding of the nature of scientific knowledge. | 12.8.2.A Demonstrate the use of empirical standards, logical arguments, and skepticism in science | Doing Science | The Scientific Method |
| | | 12.8.2.B Create scientific explanations consistent with experimental and observational evidence; make accurate predictions; strive to be logical; respect the rules of evidence; accept criticism; report methods and procedures; and | Doing Science | Experimental Set Up |
| | | | Doing Science | The Scientific Method |
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| | | | Doing Science | Introductory Physical Science Lab |

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| | | make knowledge public. | Doing Science Motion Forces Simple Machines | Bouncing Ball Lab Inertia Lab Acceleration of Gravity Lab Bike Lab |
| | | 12.8.2.C Understand that all scientific knowledge is, in principle, subject to change as new evidence becomes available. | Doing Science Doing Science | The Scientific Method Experimental Set Up |
| | 12.8.3 develop an understanding of the history of science. | 12.8.3.A Investigate and describe the contributions of diverse cultures to scientific knowledge and technological inventions. | | |
| | | 12.8.3.B Understand that changes in scientific knowledge evolve over time and almost always build on earlier knowledge. | Doing Science Doing Science | The Scientific Method Experimental Set Up |
| | | 12.8.3.C Understand that some advancements in science and technology have long-lasting effects on society. | | |