

NORTH CAROLINA STANDARD COURSE OF STUDY

Crosswalk

Physical Science

The purpose of this document is to provide a general comparison of the 2023 Physical Science Standard Course of Study and the 2009 Physical Science Standard Course of Study. It provides initial insight into similarities and differences between these two sets of standards. This document is not intended to answer all questions about the nuances of the new 2023 standards versus the previous 2009 standards..

Physical Science Standards

Note: The 2023 Physical Science standards and objectives are not intended to be the curriculum, nor do they indicate the whole of a curriculum which will be written by a local public-school unit (PSU) or school. The standards for this course have been developed to serve as the framework which will guide each PSU in the development of the curriculum for Physical Science .

Matter and Its Interactions		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>PS.PSc.1 Understand types, properties, and structure of matter.</i>	<i>PSc.2.1 Understand types, properties, and structure of matter.</i>	
PS.PSc.1.1 Construct an explanation to classify matter as: pure substance or mixture; homogeneous or heterogeneous; element or compound; solution, colloid or suspension.	PSc.2.1.1 Classify matter as: homogeneous or heterogeneous; pure substance or mixture; element or compound; metals, nonmetals or metalloids; solution, colloid or suspension.	
PS.PSc.1.2 Use models to compare the phases of matter and the physical changes they undergo.	PSc.2.1.2 Explain the phases of matter and the physical changes that matter undergoes.	
PS.PSc.1.3 Carry out investigations to compare physical and chemical properties of matter.	PSc.2.1.3 Compare physical and chemical properties of various types of matter.	
PS.PSc.1.4 Use models to interpret the data presented in Bohr diagrams and electron dot diagrams for neutral atoms of elements 1 through 18.	PSc.2.1.4 Interpret data presented in Bohr model diagrams and dot diagrams for atoms and ions of elements 1 through 18.	
PS.PSc.1.5 Use models to compare representations of atoms, ions, and isotopes.	PSc.2.1.4 Interpret data presented in Bohr model diagrams and dot diagrams for atoms and ions of elements 1 through 18.	

PS.PSc.1.6 Use the Periodic Table as a model to predict the relative properties (metallic/nonmetallic character, ionic charge, and reactivity) and arrangement of elements based on the pattern of valence electrons in the outermost energy levels of atoms.	PSc.2.2.1 Infer valence electrons, oxidation number, and reactivity of an element based on its location in the Periodic Table.	
<i>PS.PSc.2 Analyze interactions of matter within a chemical system.</i>	<i>PSc.2.2 Understand chemical bonding and chemical interactions.</i>	
PS.PSc.2.1 Construct an explanation to classify the type of chemical bond that occurs (covalent, ionic, or metallic) in a given substance.	PSc.2.2.2 Infer the type of chemical bond that occurs, whether covalent, ionic or metallic, in a given substance.	
PS.PSc.2.2 Use models to apply International Union of Pure and Applied Chemistry (IUPAC) conventions to name and write formulas for simple compounds.	PSc.2.2.3 Predict chemical formulas and names for simple compounds based on knowledge of bond formation and naming conventions.	
PS.PSc.2.3 Use mathematics and computational thinking to execute the balancing of chemical equations to illustrate the Law of Conservation of Mass.	PSc.2.2.4 Exemplify the law of conservation of mass by balancing chemical equations.	
PS.PSc.2.4 Obtain, evaluate, and communicate information to classify a chemical reaction as a synthesis, decomposition, combustion, single replacement, or double replacement reaction.	PSc.2.2.5 Classify types of reactions such as synthesis, decomposition, single replacement or double replacement.	
PS.PSc.2.5 Construct an explanation to compare the composition and properties of acids and bases.	PSc.2.2.6 Summarize the characteristics and interactions of acids and bases.	
PS.PSc.2.6 Use models to explain the interactions of acids and bases in the process of neutralization.	PSc.2.2.6 Summarize the characteristics and interactions of acids and bases.	
<i>PS.PSc.3 Understand the role of the nucleus in radiation and radioactivity.</i>	<i>PSc.2.3 Understand the role of the nucleus in radiation and radioactivity.</i>	
PS.PSc.3.1 Use models to compare nuclear reactions including alpha decay, beta decay, and gamma decay; nuclear fusion and nuclear fission.	PSc.2.3.1 Compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission.	
PS.PSc.3.2 Use mathematics and computational thinking to execute simple half-life calculations based on the radioactive decay of unstable nuclei.	PSc.2.3.2 Exemplify the radioactive decay of unstable nuclei using the concept of half-life.	
PS.PSc.3.3 Obtain, evaluate, and communicate information to explain the application of nuclear reactions to radioactive dating, medicine, and energy production.		New - created based on <i>NRC Framework</i> and stakeholder feedback

Motion and Stability - Forces and Interactions		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>PS.PSc.4 Analyze motion in terms of speed, velocity, acceleration, and momentum.</i>	<i>PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum.</i>	
PS.PSc.4.1 Analyze and interpret data to explain the motion of an object moving with a constant velocity or that is accelerating.	PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities.	
PS.PSc.4.2 Analyze and interpret data to explain the relationship between impulse and an object's change in momentum.	PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities.	New - momentum and impulse included in new objective
<i>PS.PSc.5 Understand the relationship between forces and motion.</i>	<i>Psc.1.2 Understand the relationship between forces and motion.</i>	
PS.PSc.5.1 Use mathematics and computational thinking to compare the weight and mass of an object.	PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall.	
PS.PSc.5.2 Use models to explain the velocity of an object in freefall.	PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall.	
PS.PSc.5.3 Construct an explanation to infer the effects of forces (specifically applied force and friction) on objects.	PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid.	
PS.PSc.5.4 Use models to explain the relationship between an object's motion and the interaction of forces acting on it according to Newton's Three Laws of Motion.	PSc.1.2.3 Explain forces using Newton's three laws of motion.	
<i>PS.PSc.6 Understand electricity and magnetism and their relationship.</i>	<i>PSc.3.3 Understand electricity and magnetism and their relationship.</i>	
PS.PSc.6.1 Carry out investigations to explain static and current electricity.	PSc.3.3.1 Summarize static and current electricity.	
PS.PSc.6.2 Construct an explanation to compare simple series and parallel circuits in terms of Ohm's Law.	PSc.3.3.2 Explain simple series and parallel DC circuits in terms of Ohm's law.	

PS.PSc.6.3 Obtain, evaluate, and communicate information to explain how current is affected by changes in composition, length, temperature, and diameter of wire.	PSc.3.3.3 Explain how current is affected by changes in composition, length, temperature, and diameter of wire.	
PS.PSc.6.4 Use models to explain magnetism in terms of domains, interactions of poles, and magnetic fields.	PSc.3.3.4 Explain magnetism in terms of domains, interactions of poles, and magnetic fields.	
PS.PSc.6.5 Obtain, evaluate, and communicate information to explain the application of electromagnets.	PSc.3.3.5 Explain the practical applications of magnetism.	

Energy		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>PS.PSc.7 Analyze energy transfers and transformations within a mechanical system.</i>	<i>PSc.3.1 Understand the types of energy, conservation of energy and energy transfer.</i>	
PS.PSc.7.1 Use models to explain thermal energy and its transfer.	PSc.3.1.1 Explain thermal energy and its transfer.	
PS.PSc.7.2 Use mathematics and computational thinking to explain the Law of Conservation of Energy in a mechanical system in terms of kinetic and potential energy.	PSc.3.1.2 Explain the law of conservation of energy in a mechanical system in terms of kinetic energy, potential energy and heat.	
PS.PSc.7.3 Use mathematics and computational thinking to explain work in terms of the relationship among the applied force to an object, the resulting displacement of the object, and the energy transferred to the object.	PSc.3.1.3 Explain work in terms of the relationship among the applied force to an object, the resulting displacement of the object and the energy transferred to an object.	
PS.PSc.7.4 Construct an explanation to infer the relationship between work and power, both quantitatively and qualitatively.	PSc.3.1.4 Explain the relationship among work, power and simple machines both qualitatively and quantitatively.	

Waves and Their Applications		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>PS.PSc.8 Analyze the nature of waves and their applications.</i>	<i>PSc.3.2 Understand the nature of waves.</i>	
PS.PSc.8.1 Carry out investigations to explain the quantitative and qualitative relationships among wave frequency, wave velocity, wavelength, and wave energy.	PSc.3.2.1 Explain the relationships among wave frequency, wave period, wave velocity and wavelength through calculation and investigation.	
PS.PSc.8.2 Use models to compare the characteristics of mechanical and electromagnetic waves.	PSc.3.2.2 Compare waves (mechanical, electromagnetic, and surface) using their characteristics.	
	PSc.3.2.3 Classify waves as transverse or compressional (longitudinal).	
PS.PSc.8.3 Use models to explain the wave interactions of reflection, refraction, diffraction, and interference.	PSc.3.2.4 Illustrate the wave interactions of reflection, refraction, diffraction, and interference.	
PS.PSc.8.4 Obtain, evaluate, and communicate information to explain how instruments that transmit and detect waves are used in everyday life.		New - created based on <i>NRC Framework</i> and stakeholder feedback