Physics

Standards	Benchmarks	Unit Name	Course Topic Description
1 Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.	**1.1** generate a question, identify dependent and independent variables, formulate testable, multiple hypotheses, plan an investigation, predict its outcome, safely conduct the scientific investigations, and collect and analyze data	Covered in labs throughout the course Physics and the Laws of Motion	Free-Fall Acceleration Lab
			Projectile Motion Lab
			Forces and Friction Lab
		Energy and Motion	Conservation of Mechanical Energy Lab
			Momentum Lab
			Machines and Efficiency Lab
		Heat and Thermodynamics	Thermal Equilibrium Lab
			Piston Lab
		Waves	Simple Harmonic Motion Lab
			Wave Lab
			Sound Lab
		Electrostatics	Electrostatics Lab
			Charges and Fields Lab
		Electric Current	Ohm's Law Lab
			Ohm's Law and Factors Affecting Resistance
			Resistors in Series and Parallel Lab
		Magnetism	Magnetic Field of a Solenoid Lab
			Electromagnetic Induction Lab
		Introduction to Modern Physics	Photoelectric Effect Lab
	1.2 select and use appropriate tools including technology to make measurements (in metric units), gather, process and analyze data from scientific investigations using appropriate mathematical analysis, error analysis, and graphical representation	Covered in labs throughout the course Physics and the Laws of Motion	Free-Fall Acceleration Lab
			Projectile Motion Lab
			Forces and Friction Lab
		Energy and Motion Energy and Motion	Conservation of Mechanical Energy Lab
			Momentum Lab

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Standards	Benchmarks	Unit Name	Course Topic Description
			Machines and Efficiency Lab
		Heat and Thermodynamics	Thermal Equilibrium Lab
			Piston Lab
		Waves	Simple Harmonic Motion Lab
			Wave Lab
			Sound Lab
		Electrostatics	Electrostatics Lab
			Charges and Fields Lab
		Electric Current	Ohm's Law Lab
			Ohm's Law and Factors Affecting Resistance
			Resistors in Series and Parallel Lab
		Magnetism	Magnetic Field of a Solenoid Lab
			Electromagnetic Induction Lab
		Introduction to Modern Physics	Photoelectric Effect Lab
	1.3 review evidence, communicate and defend results, and recognize that the results of a scientific investigation are always open to revision by further investigations. (e.g. through graphical representation or charts)	Covered in labs throughout the course Physics and the Laws of Motion	Free-Fall Acceleration Lab
			Projectile Motion Lab
			Forces and Friction Lab
		Energy and Motion	Conservation of Mechanical Energy Lab
			Momentum Lab
			Machines and Efficiency Lab
		Heat and Thermodynamics	Thermal Equilibrium Lab
			Piston Lab
		Waves	Simple Harmonic Motion Lab
			Wave Lab
			Sound Lab

Physics

Standards	Benchmarks	Unit Name	Course Topic Description
		Electrostatics	Electrostatics Lab
			Charges and Fields Lab
		Electric Current	Ohm's Law Lab
			Ohm's Law and Factors Affecting Resistance
			Resistors in Series and Parallel Lab
		Magnetism	Magnetic Field of a Solenoid Lab
			Electromagnetic Induction Lab
		Introduction to Modern Physics	Photoelectric Effect Lab
	1.4 analyze observations and explain with scientific understanding to develop a plausible model (e.g., atom, expanding universe)	Covered in labs throughout the course Physics and the Laws of Motion	Free-Fall Acceleration Lab
			Projectile Motion Lab
			Forces and Friction Lab
		Energy and Motion	Conservation of Mechanical Energy Lab
			Momentum Lab
			Machines and Efficiency Lab
		Heat and Thermodynamics	Thermal Equilibrium Lab
			Piston Lab
		Waves	Simple Harmonic Motion Lab
			Wave Lab
			Sound Lab
		Electrostatics	Electrostatics Lab
			Charges and Fields Lab
		Electric Current	Ohm's Law Lab
			Ohm's Law and Factors Affecting Resistance
			Resistors in Series and Parallel Lab
		Magnetism	Magnetic Field of a Solenoid Lab

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Standards	Benchmarks	Unit Name	Course Topic Description
			Electromagnetic Induction Lab
		Introduction to Modern Physics	Photoelectric Effect Lab
	1.5 identify strengths, weaknesses, and assess the validity of the experimental design of an investigation through analysis and evaluation	Covered in labs throughout the course Physics and the Laws of Motion	Free-Fall Acceleration Lab
			Projectile Motion Lab
			Forces and Friction Lab
		Energy and Motion	Conservation of Mechanical Energy Lab
			Momentum Lab
			Machines and Efficiency Lab
		Heat and Thermodynamics	Thermal Equilibrium Lab
			Piston Lab
		Waves	Simple Harmonic Motion Lab
			Wave Lab
			Sound Lab
		Electrostatics	Electrostatics Lab
			Charges and Fields Lab
		Electric Current	Ohm's Law Lab
			Ohm's Law and Factors Affecting Resistance
			Resistors in Series and Parallel Lab
		Magnetism	Magnetic Field of a Solenoid Lab
			Electromagnetic Induction Lab
		Introduction to Modern Physics	Photoelectric Effect Lab
	1.6 explain how observations of nature form an essential base of knowledge among the Montana American Indians		
2 Students, through the inquiry process,	**2.1** describe the structure of atoms, including knowledge of	Introduction to Modern Physic	Atom Models

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Standards	Benchmarks	Unit Name	Course Topic Description
demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.	**2.1.a** subatomic particles and their relative masses, charges, and locations within the atom,	Introduction to Modern Physic	Atom Models
	2.1.b the electrical and nuclear forces that hold the atom together,	Introduction to Modern Physic	Atom Models
	2.1.c fission and fusion, and	Introduction to Modern Physic	Atom Models
	2.1.d radioactive decay	Introduction to Modern Physic	Atom Models
	2.2 explain how the particulate-level structure and properties of matter affect its macroscopic properties, including the effect of		
	2.2.a valence electrons on the chemical properties of elements and the resulting periodic trends in these properties,		
	2.2.b chemical bonding,		
	2.2.c molecular geometry and intermolecular forces,		
	2.2.d kinetic molecular theory on phases of matter, and		
	2.2.e carbon-carbon atom bonding on biomolecules		
	2.3 describe the major features associated with chemical reactions, including		
	2.3.a giving examples of reactions important to industry and living organisms,		
	2.3.b energy changes associated with chemical changes,		
	2.3.c classes of chemical reactions,		
	2.3.d rates of reactions, and		
	2.3.e the role of catalysts		
	2.4identify, measure, calculate, and analyze relationships associated with matter and energy transfer or transformations, and the associated		

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Standards	Benchmarks	Unit Name	Course Topic Description
	conservation of mass		
	2.5explain the interactions between motions and forces, including	Physics and the Laws of Motion	Forces and the Laws of Motion
			Forces and Friction Lab
			Motion in One Dimension
			Free-Fall Acceleration Lab
	2.5.a the laws of motion and	Physics and the Laws of Motion	Forces and the Laws of Motion
			Forces and Friction Lab
	2.5.b an understanding of the gravitational and electromagnetic forces	Physics and the Laws of Motion	Motion in One Dimension
			Free-Fall Acceleration Lab
	2.6 explain how energy is stored, transferred, and transformed, including	Work and Energy	Conservation of Mechanical Energy Lab
		Heat and Thermodynamics	Thermal Equilibrium Lab
	2.6.a the conservation of energy,	Work and Energy	Conservation of Mechanical Energy Lab
	2.6.b kinetic and potential energy and energy contained by a field,	Work and Energy	Conservation of Mechanical Energy Lab
	2.6.c heat energy and atomic and molecular motion, and	Heat and Thermodynamics	Thermal Equilibrium Lab
	2.6.d energy tends to change from concentrated to diffuse		
	2.7 describe how energy and matter interact, including	Waves	Wave Lab
			Unit Exam
			Light
		Introduction to Modern Physics	Photoelectric Effect Lab
		Electric Current	Unit Exam
	2.7.a waves,	Waves	Wave Lab
			Unit Exam
	2.7.b the electromagnetic spectrum,	Waves	Light
	2.7.c quantization of energy, and	Introduction to Modern Physics	Photoelectric Effect Lab

Physics

Standards	Benchmarks	Unit Name	Course Topic Description
	2.7.d insulators and conductors	Electric Current	Unit Exam
5 Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures and societies.	**5.1** predict how key factors (e.g., technology, competitiveness, and world events) affect the development and acceptance of scientific thought		
	5.2 give examples of scientific innovation challenging commonly held perceptions	Introduction to Modern Physics	Special Theory of Relativity
	5.3 evaluate the ongoing, collaborative scientific process by gathering and critiquing information		
	5.4 analyze benefits, limitations, costs, consequences, and ethics involved in using scientific and technological innovations (e.g., biotechnology, environmental issues)	Waves	Light
	5.5 explain how the knowledge of science and technology applies to contemporary Montana American Indian communities (e.g., natural resources development, management and conservation)		
6 Students understand historical developments in science and technology.	**6.1** analyze and illustrate the historical impact of scientific and technological advances, including Montana American Indian examples		
	6.2 trace developments that demonstrate scientific knowledge is subject to change as new evidence becomes available	Introduction to Modern Physics	Atom Models
	6.3 describe, explain, and analyze science as a human endeavor and an ongoing process		