RCSD Physics * Quick Reference Pacing Guide * 2024-2025

***Note: This document is meant to be a quick reference of suggested standards for each nine weeks.**
For a complete description of the course, standards and detailed performance objectives,
see the MS College and Career Readiness Standards for Science

1st Term: Aug. 1 - Oct. 4	2nd Term: Oct. 15 - Dec. 20	3rd Term: Jan. 7 - Mar 7	4th Term: March 17 - May 23
July 25-26;29-31 - Staff Development *Aug. 1 - First Day of School* *Sept 2 -Labor Day/Holiday* *Oct. 7-11 - School Holiday/Fall Break* *Oct. 14 - Staff Development*	*Nov. 25-29 - Thanksgiving Break* *Dec. 16 - 20 - Exams* *Dec. 20 - Reduced Day* *Dec. 23 - Jan. 3 - Christmas Break*	*Jan. 6 - Staff Development* *Jan. 7 - Students Return* *Jan. 20 - MLK Day/Holiday* *Feb. 17 - Presidents' Day/Holiday* *March 10 - 14 - Spring Break*	*April 18, 21 - Easter/Holiday* ***STATE TESTING Window opens mid-April**** *May 19-23 - Exams* *May 23 - Reduced Day* *May 23 - Last Teacher Day*
Classroom Expectations ***Lab Safety; Tools of Science*** ***Introduction to Physics*** ***Math Review: Significant figures, metric conversions, graphical analysis, problem solving*** **One Dimensional Motion** **PHY.1 Students will investigate and understand how to analyze and interpret data.** *PHY.1.1 Design and conduct experiments to generate and interpret graphical evidence of distance, velocity, and acceleration through motion.* *PHY.1.2 Interpret and predict 1-D motion based on displacement vs. time, velocity vs. time, or acceleration vs. time graphs (e.g., free-falling objects)* *PHY.1.3 Solve problems using kinematic equations.* *PHY.1.4 Use graphical analysis to derive kinematic equations.* *PHY.1.5 Motion concepts such as distance-displacement, speed-velocity, and acceleration.* *PHY.1.6 Analyze quantitative data to explore displacement, velocity, and*	**Work and Energy** **PHY.3 Students will develop an understanding of concepts related to work and energy.** *PHY.3.1 Use mathematical and computational analysis to qualitatively and quantitatively analyze the concept of work, energy, and power to explain and apply the conservation of energy.* *PHY.3.3 Through real-world applications, draw conclusions about mechanical potential energy and kinetic energy using online simulations and/or laboratory experiences.* *PHY.3.5 Investigate, collect data, and summarize the principles of thermodynamics by exploring how heat energy is transferred from higher temperature to lower temperature until equilibrium is reached.* *PHY.3.2 Use mathematical and computational analysis to explore conservation of momentum and impulse.* *PHY.3.4 Design and conduct investigations to compare conservation of momentum and conservation of kinetic energy in perfectly inelastic and elastic collisions using probe systems, online simulations, and/or laboratory*	**Waves** **PHY.4 Students will investigate and explore wave properties.** *PHY.4.1 Characteristics and properties of simple harmonic motions, sound, and light.* *PHY.4.2 Describe and model the characteristics and properties of mechanical waves by simulating and investigating properties of simple harmonic motion.* *PHY.4.3 Explore wave characteristics (e.g., velocity, period, frequency, amplitude, phase, and wavelength).* *PHY.4.4 Investigate and communicate the relationship between the energy of a wave in terms of amplitude and frequency using probe systems, online simulations, and/or laboratory experiences.* *PHY.4.5 Design, investigate, and collect data on standing waves and waves in specific media using online simulations, probe systems, and/or laboratory experiences.* *PHY.4.6 Explore and explain the Doppler effect as it relates to a moving source and to a moving observer using online simulations, probe systems, and/or*	**Electricity and Magnetism** **PHY.5 Students will investigate the key components of electricity and magnetism** *PHY.5.2 Explore the characteristics of static charge and how a static charge is generated.* *PHY.5.3 Analyze problems dealing with electric field and electric potential.* *PHY.5.3 Analyze problems dealing with current, voltage, and resistance as related to Ohm's law.* *PHY.5.4 Develop and use models to explain how electric circuits work* *PHY.5.6 Use schematic diagrams to analyze the current flow in series and parallel electric circuits, given the component resistances and the imposed electric potential.* *PHY.5.1 Analyze and explain electricity and the relationship between electricity and magnetism.* *PHY.5.5 Design and conduct an investigation of magnetic poles, magnetic flux and magnetic field using online simulations, probe systems, and/or laboratory experiences.*

acceleration of various objects. *PHY.1.7 Predict graph shapes for distance/time, velocity/time, and acceleration/time graphs.* *PHY.1.8 Replicate the motion predicted by a 1D motion graph.* **Newton's Laws** **PHY.2 Students will develop an understanding of concepts related to Newtonian dynamics.** *PHY.2.1 Identify forces acting on a system by applying Newton's laws* *PHY.2.2 Use models to explain and predict the motion of an object* *PHY.2.3 Solve vector problems and find net forces acting on a body using free-body diagrams and/or online simulations* *PHY.2.4 Use vectors and mathematical analysis to explore the 2D motion of objects.* *PHY.2.5 Derive simple equations of motion for various systems using Newton's second law (e.g. net force equations)* *PHY.2.6 Explore forces (e.g. friction, force applied, normal, and tension)* *PHY.2.7 Analyze real-world applications of Newton's 3 laws of motion* *PHY.2.8 Design an experiment to determine the forces acting on a stationary object on an incline plane. Test your conclusions.* *PHY.2.9 Draw diagrams of forces applied to an object and predict the angle of incline that will result in unbalanced forces acting on the object.*	*experiences.* **Circular Motion and Gravity** *PHY.2.2 Use models such as free body diagrams to explain and predict the motion of an object from simple to complex motions, including circular motion.* *PHY.2.10 Apply the effects of the universal gravitation to generate a digital/physical graph, and interpret the forces between two masses, acceleration due to gravity, and planetary motion.* *PHY.2.11 Explain centripetal acceleration while undergoing uniform circular motion to explore Kepler's third law using online simulations, models, and/or probe systems*	*real-world experiences.* *PHY.4.7 Explain the laws of reflection and refraction, and apply Snell's law to describe the relationship between the angles of incidence and refraction.* *PHY.4.8 Use ray diagrams and the thin lens equations to solve real-world problems involving object distance from lenses, using a lens bench, online simulations, and/or laboratory experiences.* *PHY.4.9 Research and defend conclusions among the different bands of electromagnetic radiation, including characteristics, properties, and similarities/differences, using examples of uses of each, including radio waves, microwaves, infrared, visible light, ultraviolet, and gamma rays.*	*PHY.5.7 Analyze and communicate the relationship between magnetic fields and electrical current by induction, generators, and electric motors (e.g., microphones, speakers, generators, and motors) using Ampere's and Faraday's laws* **Nuclear Energy** **PHY.6 Students will demonstrate an understanding of the basic principles of nuclear energy.** *PHY.6.1 Analyze and explain the concepts of nuclear physics.* *PHY.6.2 Explore the mass number and atomic number of the nucleus of an isotope of a given chemical element.* *PHY.6.3 Investigate the conservation of mass and the conservation of charge by writing and balancing nuclear decay equations for alpha and beta decay.* *PHY.6.4 Simulate the process of nuclear decay using online simulations and/or laboratory experiences and using mathematical computations determine the half-life of radioactive isotopes.*