General Physics Curriculum Map

Standards	**Content**	**Skills/Practices**	**Materials/ Resources**	**Assessments (All)** Daily/Weekly/ Benchmarks	**Timeline** (Months/Weeks /Days)
NYS Key Idea 3: Critical thinking skills are used in the solution of mathematical problems. M3.1 Apply algebraic and geometric concepts and skills to the solution of problems. • explain the physical relevance of properties of a graphical representation of real world data, e.g., slope, intercepts, area under the curve Key Idea 2:	**Unit 1: Mathematical Tools** 1. Perform calculations with SI units and scientific notation 2. Understand the need for accuracy and precisions when making measurements and reporting data 3. Display and evaluate data using graphs as well as linearizing data and create mathematical models	1. Perform calculations with SI units and scientific notation 2. Understand the need for accuracy and precisions when making measurements and reporting data 3. Display and evaluate data using graphs as well as linearizing data and create mathematical models	School Issued Chromebooks Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	**Labs:** ● Life of Pi **Summative:** ● Test ● Quizzes **Formative:** ● Math Pre-test ● Bellringers ● Homework	First two weeks of September

Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design. 2.2 Collect information about the behavior of a system and use modeling tools to represent the operation of the system. • use observations of the behavior of a system to develop a model 2.3 Find and use mathematical models that behave in the same manner as the processes under					

investigation. • represent the behavior of real-world systems, using physical and mathematical Models Key Idea 1: Engineering design is an iterative process involving modeling and optimization (finding the best solution within given constraints) which is used to develop technological solutions to problems within given constraints. (Note: The design process could apply to activities from simple investigations to long-term					

NYS Key Idea 5: Energy and matter interact through forces that result in changes in motion. 5.1 Explain and predict different patterns of motion of objects (e.g., linear and uniform circular motion, velocity and acceleration, momentum and inertia). i. construct and interpret graphs of position, velocity, or acceleration versus time iii. determine the acceleration due to gravity near the surface of Earth	**Unit 2:** **Kinematics: 1D Motion** **in the x direction** **1.** Represent scalar versus vector quantities 2. Describing the difference between distance and displacement 3. Study average & instantaneous velocity 4. Study average & constant acceleration 5. Describe motion with motion diagrams and incorporating coordinate systems. 6. Use graphs and equations to solve problems involving moving objects 7. Draw motion graphs, and motion maps and	**1.** Represent scalar versus vector quantities 2. Describing the difference between distance and displacement 3. Study average & instantaneous velocity 4. Study average & constant acceleration 5. Describe motion with motion diagrams and incorporating coordinate systems. 6. Use graphs and equations to solve problems involving moving objects 7. Draw motion graphs, and motion maps and interpret motion graphs using slope and area.	School Issued Chromebooks Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	**Labs:** ● Scalar v. Vector ● Roll with it ● Waterfall ● We all Fall Down **Summative:** ● Test ● Quizzes ● Kinematics google slides project **Formative:** ● Bellringers ● Homework	Late September to mid October

5.1a Measured quantities can be classified as either vector or scalar. 5.1d An object in linear motion may travel with a constant velocity* or with acceleration*. (Note: Testing of acceleration will be limited to cases in which acceleration is constant. 5.1 iii. determine the acceleration due to gravity near the surface of Earth	interpret motion graphs using slope and area. **-In the y direction** **1.** Calculate free fall acceleration				
NYS 5.1 vii. sketch the theoretical	**Unit 3: Projectile Motion-2D motion** 1. Describe	SWBAT: sketch the	School Issued Chromebook	**Labs:** ● Shoot For Your Grade	Mid to Late October

path of a projectile Performance indicators: 5.1e An object in free fall accelerates due to the force of gravity.* Friction and other forces cause the actual motion of a falling object to deviate from its theoretical motion. (Note: Initial velocities of objects in free fall may be in any direction.) 5.1f The path of a projectile is the result of the simultaneous effect of the horizontal and vertical components of its motion; these components	projectile motion 2. Predict the pathway of a projectile 3. Determine height and range of projectile 4. Observe and show how horizontal and vertical velocities are independent of each other	theoretical path of a projectile Explain the optimal angle to launch a projectile that will result in the greatest horizontal and vertical distances	Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	• Rocket Science **Summative:** • Test • Quizzes • Projectile Motion Posters **Formative:** • Bellringers • Homework	

act independently. 5.1g A projectile's time of flight is dependent upon the vertical component of its motion.					
NYS 5.1a Measured quantities can be classified as either vector or scalar. 5.1i According to Newton's First Law, the inertia of an object is directly proportional to its mass. An object remains at rest or moves with constant velocity, unless acted upon by an unbalanced	**Unit 4: DYNAMICS AND STATICS** **Vectors** 1. What is the difference between vector and scalar 2. Graphical vector representation 3. Graphical vector addition 4. Mathematical vector addition **Forces** 1. Free body diagrams: define and show forces acting on an object 2. Determine the	HS-PS2-1. Analyze data to support the claim that Newton's Second Law of Motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration	School Issued Chromebook Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	**Labs:** ● Foot Friction ● Weight v. Mass **Summative:** ● Test ● Quizzes ● Newton's Laws of Motion Video Project **Formative:** ● Bellringers ● Homework	November to mid December

force 5.1k According to Newton's Second Law, an unbalanced force causes a mass to accelerate*. 5.1q According to Newton's Third Law, forces occur in action/reaction pairs. When one object exerts a force on a second, the second exerts a force on the first that is equal in magnitude and opposite in direction. Performance indicators: 5.1j When the net	normal force on the object 3. Recognize and calculate static and kinetic friction				

force on a system is zero, the system is in equilibrium. 5.1o Kinetic friction* is a force that opposes motion.					
NYS 5.1t Gravitational forces are only attractive, whereas electrical and magnetic forces can be attractive or repulsive. 5.1u The inverse square law applies to electrical* and gravitational* fields produced by point sources.	**Unit 5: Universal Law of Gravitation** 1. Use the masses and distances between objects to calculate the gravitational force 2. Explain what gravity is and what factors affect it	HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.	School Issued Chromebook Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology	**Labs:** ● The Circle of Life **Summative:** ● Test ● Quizzes **Formative:** ● Bellringers ● Homework	Mid December to Mid January

			Castle Learning		
NYS 5.1p The impulse* imparted to an object causes a change in its momentum*. 5.1q According to Newton's Third Law, forces occur in action/reaction pairs. When one object exerts a force on a second, the second exerts a force on the first that is equal in magnitude and opposite in direction. 5.1r Momentum is conserved in a closed system.* (Note: Testing will be limited to momentum in one dimension.)	**Unit 6: Momentum & Impulse** 1. Students will be able to understand Momentum and Its Conservation according to Newton's 3rd law 2. Describe Momentum & impulse and apply them to the interactions of objects 3. Elastic versus inelastic collisions	HS-PS2-3. Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.* HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. [	School Issued Chromebook Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	**Labs:** ● The Explosion Lab ● Impulse Lab **Summative:** ● Test ● Quizzes ● Impulse Egg Project **Formative:** ● Bellringers ● Homework	Mid January to Mid February
NYS Key Idea 4: Energy exists in	**Unit 7: Energy** 1. Differentiating	HS-PS3-1. Create a computational model to calculate	School Issued Chromebook	**Labs:** ● Hooke's Law ● Pendulum	Mid February to end of March

many forms, and when these forms change energy is conserved. 4.1 Observe and describe transmission of various forms of energy. i. describe and explain the exchange among potential energy, kinetic energy, and internal energy for simple mechanical systems, such as a pendulum, a roller coaster, a spring, a freely falling object v. observe and explain energy conversions in real -world situations vi. recognize and	between potential and kinetic energy 3. Calculating the PE and KE at various points~ Determine how energy is used to do work 4. Explain that the total amount of energy in a closed system never changes 5. Energy form changes and conservation on energy 6. Work energy theorem 7. Calculating work and power 8. Relating power to energy 9. Elastic potential energy calculation	the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another	Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	• Dropper Popper • Who is the Most Powerful? **Summative:** • Test:Created using previous years regents questions taken from problem attic/castle learning • Quizzes:Created using previous years regents questions taken from problem attic/castle learning • Rube Goldberg Project: Students will design and build a rube goldberg machine outside of the classroom **Formative:** • Bellringers • Homework	

describe conversions among different forms of energy in real or hypothetical devices such as a motor, a generator, a photocell, a battery 4.1a All energy transfers are governed by the law of conservation of energy.* 4.1b Energy may be converted among mechanical, electromagnetic, nuclear, and thermal forms. 4.1c Potential energy is the energy an object possesses by virtue of its position or		form of energy			

condition. Types of potential energy include gravitational* and elastic*. 4.1d Kinetic energy* is the energy an object possesses by virtue of its motion. 4.1g When work* is done on or by a system, there is a change in the total energy* of the system. 4.1h Work done against friction results in an increase in the internal energy of the system. 4.1i Power* is the time-rate					

at which work is done or energy is expended.					
NYS 4.1j Energy may be stored in electric* or magnetic fields. This energy may be transferred through conductors or space and may be converted to other forms of energy. 4.1k Moving electric charges produce magnetic fields. The relative motion between a conductor and a magnetic field may produce a potential difference in the	**Unit 8: Electrostatics** 1. The difference between static and standard electricity 2. Measuring static electricity 3. Coulomb's Law 4. Conservation on charge 5. Drawing electrical fields through graphical and mathematical representation	HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects	School Issued Chromebook Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	**Labs:** ● Static Electricity ● Shocking Pie Pan **Summative:** ● Test ● Quizzes **Formative:** ● Bellringers ● Homework	April

conductor.					
NYS 4.1 xv. map the magnetic field of a permanent magnet, indicating the direction of the field between the N (north-seeking) and S (south-seeking) poles	**Unit 9: Magnetism** 1. Relating magnetism and electricity 2. Permanent vs. temporary 3. Drawing magnetic fields for bar magnets along with graphical representation	HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	School Issued Chromebook Teacher generated google slides notes Calculator School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	**Labs:** ● Mapping Magnetic Fields **Summative:** ● Test ● Quizzes: **Formative:** ● Bellringers ● Homework	Early to mid May
NYS 4.3 Students can explain variations in wavelength and frequency in terms	**Unit 10: Waves** 1. Explain how force, velocity and acceleration change as an object vibrates	HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the period,	School Issued Chromebook Teacher generated google slides notes Calculator	**Labs:** ● Wave Characteristic Slinky Lab ● Speed of Sound Lab	Mid May to June

of the source of the vibrations that produce them, e.g., molecules, electrons, and nuclear particles 4.3a An oscillating system produces waves. The nature of the system determines the type of wave produced. 4.3b Waves carry energy and information without transferring mass. This energy may be carried by pulses or periodic waves. 4.3c The model of a wave incorporates the characteristics of amplitude, wavelength,*	2. Identify Amplitude 3. Recognize the relationship between period and frequency 4. Calculate the period and frequency of an object in SHM 5. Calculate wave speed, frequency, and wavelength **Sound Waves** **1.** Explain how sound waves are produces 2. Relate frequency to pitch 3. Compare the speed of sound in various media 4. Explain the Doppler effect and shift 5. Explain resonance 6. Explain sonic booms	frequency, wavelength, and speed of waves traveling and transferring energy (amplitude, frequency) in various media. HS-PS4-2. Evaluate questions about the advantages of using a digital transmission and storage of information HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	School Provided Lab equipment Lab Manual Created by Teacher Physics Reference Table Textbook: Physics Principles & Problems Schoology Castle Learning	● Standing Waves **Summative:** ● Test ● Quizzes **Formative:** ● Bellringers ● Homework	

frequency*, period*, wave speed*, and phase. 4.3d Mechanical waves require a material medium through which to travel. 4.3e Waves are categorized by the direction in which particles in a medium vibrate about an equilibrium position relative to the direction of propagation of the wave, such as transverse and longitudinal waves. 4.3f Resonance occurs when energy is	• **Electromagnetic Waves** **8.** Differentiate between electromagnetic waves o Radio, microwaves, infrared, visible, UV, x-rays, gamma and cosmetic waves **Light and Reflection** 1. Characteristics of Light o Identify the components of the electromagnetic spectrum o Calculate the frequency or wavelength of electromagnetic radiation 2. Color and Polarization 3. Refraction 4. Reflection of light				

transferred to a system at its natural frequency. 4.3g Electromagnetic radiation exhibits wave characteristics. Electromagnetic waves can propagate through a vacuum 4.3 Explain variations in wavelength and frequency in terms of the source of the vibrations that produce them, e.g., molecules, electrons, and	o Law of reflection 5. Electromagnetic spectrum				

nuclear particles 4.3i When a wave moves from one medium into another, the wave may refract due to a change in speed. The angle of refraction (measured with respect to the normal) depends on the angle of incidence and the properties of the media (indices of refraction).* 4.3j The absolute index of refraction is inversely proportional to the speed of a wave.* 4.3k All frequencies of electromagnetic					

radiation travel at the same speed in a vacuum.*					