

Physics Curriculum Map

MONTH	CONTENT	NYS STANDARD/KEY IDEA/PERFORMANCE INDICATOR	LAB THEMES	SKILLS
September	<p><u>Unit 1 - Units and Scientific Notation</u></p> <ul style="list-style-type: none"> ☞ SI System of Units ☞ Unit Conversion ☞ Scientific Notation ☞ Significant Figures ☞ Graphical Analysis <p><u>Unit 2 - Kinematics</u></p> <ul style="list-style-type: none"> ☞ Scalar vs. vector ☞ Displacement/distance ☞ Velocity/speed ☞ Acceleration <p><u>Unit 3 - Uniform Accelerated Motion</u></p> <ul style="list-style-type: none"> ☞ Three equations of motion ☞ Rectilinear motion ☞ Freely falling bodies 	<p>5.1 a</p> <p>5.1 c</p> <p>5.1 d</p> <p>5.1 e</p>	<p>☉Math Toolkit</p> <p>☉Linear Measurement</p> <p>☉Velocity</p> <p>☉Acceleration</p>	<ul style="list-style-type: none"> ☉ Understand the approximate values of 1 kg and 1 m ☉ Convert using metric units ☉ Determine the resultant of two or more vectors graphically ☉ Distinguish between distance and displacement ☉ Compare and contrast the two cases of equilibrium (static and dynamic) ☉ Determine the slopes and areas of graphs ☉ Graphical analysis of displacement vs time, velocity vs time and acceleration vs time graphs.

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<p>September (cont.)</p>				<p><u>Pertinent Reference Table Equations</u></p> $\bar{v} = \frac{d}{t}$ $a = \frac{\Delta v}{t}$ $v_f = v_i + at$ $d = v_i t + \frac{1}{2} at^2$ $v_f^2 = v_i^2 + 2ad$

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October	<u>Unit 4 - Two-dimensional motion</u>	5.1 b	ⓉFree Fall	Ⓞ Theoretical path of a projectile (with and without air resistance)
		5.1 c		
		5.1 f	ⓉProjectile Motion	
	↻ Trajectories	5.1 g		Ⓞ Calculate the position and velocity of a projectile at any point using the horizontal and vertical components of the motion
	↻ Vector Components	5.1 h	ⓉTarget Practice	
		5.1 i		
		5.1 j	ⓉVectors	
		5.1 l		Ⓞ Review the trigonometry of right triangles
		5.1 m		Ⓞ Resultant of two or more vectors (graphically)
		5.1 o		Ⓞ Resolve a single vector into components
<u>Unit 5 - Static Forces</u>	5.1 s		Ⓞ Identify the forces acting on an object	
↻ Newton's First Law	5.1 t		Ⓞ Inertia is directly related to mass	
↻ Equilibrium	5.1 u		Ⓞ Find the force of gravity between two masses	
↻ Gravitational forces				
↻ Frictional forces				
↻ Spring forces				

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<p>October (cont.)</p>				<p>☞ Graphically and analytically represent the inverse square nature of gravitational force</p> <p>☞ Contrast kinetic and static friction</p> <p>☞ Graphically represent Hooke’s Law and spring constant</p> <p>☞ <u>Analyze vector diagrams of mechanical systems in equilibrium</u></p> <p><u>Pertinent Reference Table Equations</u></p> $g = \frac{F_g}{m}$ $F_g = \frac{Gm_1 m_2}{r^2}$ $F_f = \mu F_N$ $F_s = kx$ $A_x = A \cos\theta$ $A_y = A \sin\theta$

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November	<p><u>Unit 6 - Dynamic Forces</u></p> <p>⌚ Newton's Second Law</p> <p>⌚ Newton's Third Law</p> <p>⌚ Free Body Diagrams</p> <p>⌚ Uniform Circular Motion</p>	<p>5.1 k</p> <p>5.1 n</p> <p>5.1 p</p> <p>5.1 q</p> <p>5.1 r</p>	<p>⑨ Coefficient of Friction</p> <p>⑨ Hooke's Law</p> <p>⑨ Centripetal Force</p> <p>⑨ Conservation of Momentum</p>	<p>⌚ Analyze vector diagrams of nonequilibrium mechanical systems and find the net force</p> <p>⌚ Contrast horizontal motion with motion on an inclined plane</p> <p>⌚ Identify the directions of centripetal force, centripetal acceleration and velocity vectors for objects in circular motion</p> <p>⌚ Identify reaction forces</p> <p>⌚ Analyze the motions of objects before and after collisions</p> <p><u>Pertinent Reference Table Equations</u></p> $a = \frac{F_{net}}{m}$ $F_c = ma_c \quad a_c = \frac{v^2}{r}$ $p = mv$ $J = Ft = \Delta p$ $p_{before} = p_{after}$
	<p><u>Unit 7 - Momentum and Impulse</u></p> <p>⌚ Momentum</p> <p>⌚ Impulse</p> <p>⌚ Conservation of momentum</p>			

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December	<p><u>Unit 8 - Work, Energy and Power</u></p> <p>⊗ Work and Power</p> <p>⊗ Kinetic Energy</p> <p>⊗ Gravitational Potential Energy</p> <p>⊗ Elastic Potential Energy</p> <p>⊗ Work-Energy Theorem</p>	<p>4.1 a</p> <p>4.1 b</p> <p>4.1 c</p> <p>4.1 d</p> <p>4.1 e</p> <p>4.1 f</p> <p>4.1 g</p> <p>4.1 h</p> <p>4.1 i</p>	<p>⊗Power</p> <p>⊗Energy Stored in a Spring</p> <p>⊗Period of a Pendulum</p> <p>⊗Conservation</p>	<p>⊗ Factors affecting the period of a pendulum</p> <p>⊗ Contrast the work done and power developed while moving up stairs</p> <p>⊗ Graphically represent kinetic and potential energies</p> <p>⊗ Calculate the work done against friction in a variety of situations</p> <p>⊗ Identify the types of mechanical energy at any point in an object's motion</p> <p>⊗ Identify the location of maximum speed, displacement, energies for a pendulum.</p> <p><u>Pertinent Reference Table Equations</u></p> $W = Fd = E_T$ $P = \frac{W}{t} = \frac{Fd}{t} = Fv$ $KE = \frac{1}{2}mv^2$ $\Delta PE = mg \Delta h$ $PE_s = \frac{1}{2}kx^2$ $E_T = PE + KE + Q$
	<p><u>Unit 9 - Conservation of Energy</u></p> <p>⊗ Conservation of Energy</p>			

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January	<p><u>Unit 10 - Electrostatics</u></p> <ul style="list-style-type: none"> ⌘ Atomic structure ⌘ Conservation of Charge ⌘ Elementary charge ⌘ Electric fields ⌘ Potential difference 	<p>4.1 j 5.1 s 5.1 t 5.1 u</p>	<p>Ⓢ Electrostatics</p>	<ul style="list-style-type: none"> Ⓢ Knowledge of basic atomic structure Ⓢ Behavior of charges and interactions between charged and uncharged objects Ⓢ Conservation of charge and symmetry of such to predict conduction Ⓢ Graphically and analytically represent the inverse square nature of electrostatic force Ⓢ Draw electric field lines around charged objects and between parallel plates using a positive test charge <p><u>Pertinent Reference Table Equations</u></p> $F_e = \frac{kq_1 q_2}{r^2}$ $E = \frac{F}{q}$ $V = \frac{W}{q}$

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<h1 style="writing-mode: vertical-rl; transform: rotate(180deg);">February</h1>	<p><u>Unit 11 - Current and Electricity</u></p> <ul style="list-style-type: none"> ∞ Electric Current ∞ Resistance of a Conductor ∞ Ohm's Law ∞ Electric Power and Energy 	<p>4.1 n 4.1 o</p>	<p>⑨Using Multimeters</p> <p>⑨Ohm's Law</p>	<ul style="list-style-type: none"> ∞ Use ammeters and voltmeters to determine the resistance on a circuit ∞ Compare and contrast the resistance of conductors of various lengths, materials and cross-sectional areas ∞ Calculate power and energy expenditures for a variety of devices <p><u>Pertinent Reference Table Equations</u></p> $I = \frac{q}{t}$ $R = \frac{V}{I}$ $R \rho = \frac{L}{A}$ $P = VI = I^2 R = \frac{V^2}{R}$ $W = Pt = VIt = I^2 Rt = \frac{V^2 t}{R}$

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March	<p><u>Unit 12 - Circuits</u></p> <ul style="list-style-type: none"> ⌘ Series Circuits ⌘ Parallel Circuits <p><u>Unit 13 - Magnetism</u></p> <ul style="list-style-type: none"> ⌘ Magnetic Fields ⌘ Electromagnetism ⌘ Generators/Motors 	<p>4.1 j 5.1 t 5.1 u</p>	<ul style="list-style-type: none"> Ⓣ Series and Parallel Circuits Ⓣ Magnetic Field Lines Around a Permanent Magnet Ⓣ Magnetic Induction 	<ul style="list-style-type: none"> Ⓢ Build simple and parallel circuits and be able to predict the behavior of light bulbs in such circuits Ⓢ Draw a schematic diagram from a given list of components Ⓢ Identify the appropriate location for ammeters and voltmeters in a circuit Ⓢ Solve circuit diagrams using the series and parallel equations Ⓢ Map the magnetic field of a permanent magnet, distinguishing between N and S poles Ⓢ Recognize and describe conversions among different forms of energy in devices such as motors, generators, photocells or batteries <p style="text-align: center;"><u>Series Circuits</u></p> $I = I_1 = I_2 = I_3 =$ $V = V_1 + V_2 + V_3 =$ $R_{eq} = R_1 + R_2 + R_3 =$ <p style="text-align: center;"><u>Parallel Circuits</u></p> $I = I_1 + I_2 + I_3 =$ $V = V_1 = V_2 = V_3 =$ $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} =$

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April	<p><u>Unit 14-Wave Characteristics</u></p> <ul style="list-style-type: none"> ☞ Mechanical/Electromagnetic Waves ☞ Transverse/Longitudinal Waves ☞ Period ☞ Wavelength ☞ Amplitude ☞ Speed ☞ Phase ☞ Sound and Light 	<p>4.3a 4.3b 4.3c 4.3d 4.3e 4.3g 4.3k</p>	<p>☉ Speed of Sound Lab</p>	<ul style="list-style-type: none"> ☞ Draw waves with various characteristics ☞ Determine the net motion of particles in a wave ☞ Describe the difference between mechanical and electromagnetic waves ☞ Differentiate between transverse and longitudinal waves ☞ Compare the characteristics between two transverse waves for frequency, period, amplitude, wavelength and speed and how these characteristics manifest themselves in light and sound waves ☞ Determine the type of electromagnetic wave from its frequency or wavelength ☞ Compare the frequencies of color of visible light <p style="text-align: center;"> <u>Pertinent Reference Table</u> <u>Equations</u> </p> $T = \frac{1}{f} \quad v = f\lambda$

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May	<p><u>Unit 15 - Wave Behaviors</u></p> <ul style="list-style-type: none"> ☞ Reflection ☞ Refraction ☞ Dispersion ☞ Diffraction ☞ Doppler Effect ☞ Interference ☞ Standing Waves ☞ Resonance 	<p>4.3f 4.3h 4.3i 4.3j 4.3l 4.3m 4.3n</p>	<p>☉Reflection of Light ☉Refraction of Light ☉ Energy Levels of Hydrogen</p>	<ul style="list-style-type: none"> ☞ Observe, sketch and interpret the behavior of a wave as it reflects from a boundary ☞ Draw a ray diagram for a given reflection and identify angles of incidence and reflection. Identify distance to object and to image ☞ Observe, sketch and interpret the behavior of a wave as it refracts at a boundary ☞ Draw a ray diagram for a given refraction and identify angles of incidence and refraction. ☞ Describe the relationship of a wavelength to that of the size of the opening or obstacle causing diffraction ☞ Describe the relationship between source, observer with respect to frequency, wavelength and speed (Doppler effect) ☞ Predict the superposition of two waves interfering constructively and destructively

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May (cont.)				<p>☞ Determine amplitude, phase, nodes and antinodes of a standing wave</p> <p>☞ Relate the importance of standing waves in producing resonance</p> <p>Pertinent Reference Table Equations</p> <hr/> $n_1 \sin\theta_1 = n_2 \sin\theta_2$ $\theta_i = \theta_r$ $\frac{n_1}{n_2} = \frac{v_1}{v_2} = \frac{\lambda_1}{\lambda_2}$ $n = \frac{c}{v}$

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June	<u>Unit 16 - Modern Physics</u>			
	<ul style="list-style-type: none"> ☞ Quantum Physics ☞ Models of the Atom ☞ Hydrogen/Mercury ☞ Energy Level 	<ul style="list-style-type: none"> 5.3a 5.3b 5.3c 5.3d 5.3e 5.3f 5.3g 5.3h 5.3i 	<ul style="list-style-type: none"> ☉ Half-Life Lab ☉ Spectral Analysis Lab 	<ul style="list-style-type: none"> ☞ Interpret energy-level diagrams (reference tables) ☞ Correlate spectral lines with energy-level diagram ☞ Quantitatively determine energy of a photon frequency and wavelength ☞ Classification of Matter (reference tables) ☞ Particles of the standard model (reference tables) ☞ Quantitatively convert energy to mass and vice versa <p><u>Pertinent Reference Table Equations</u></p> $E_{\text{photon}} = E_i - E_f$ $E = hf$ $E = mc^2$

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