YEAR AT A GLANCE: *REGENTS PHYSICS (updated Oct 2024)*

	UNIT 1	**UNIT 2**	**UNIT 3**	**UNIT 4**	**UNIT 5**	**UNIT 6**
Title	Measurement and Mathematics	Mechanics	Energy	Electricity and Magnetism	Waves	Modern Physics
Unit Length *(weeks taught)*	2-4weeks	13-16 weeks	3-4 weeks	5-6 weeks	4-5 weeks	2-4 weeks
Performance Task *(e.g., Persuasive Essay, DBQ, Nutritional Analysis, etc.)*	**• Use scientific notation and units correctly in calculations.** **•Identify and quantify sources of error.** **• Construct and interpret graphs.** **• Use trig functions to solve math equations.**	**• Construct and interpret graphs of position, velocity and acceleration vs.** **• Determine and interpret slopes and areas of motion graphs.** **• Determine the acceleration of gravity near surface of the Earth.**	**• Describe and explain the exchange among potential, kinetic, and internal energy for simple mechanical systems.** **• Predict velocities, heights and spring compressions based on energy conservation.**	**• Recognize and describe conversions among different forms of energy in devices such as a motor, a generator, a photocell, and a battery.** **• Measure current and voltage in a circuit.** **• Use**	**• Compare the characteristics of two transverse waves such as amplitude, frequency, wavelength, speed, period and phase.** **• Draw wave forms with various characteristics.** **• Identify nodes and antinodes in standing**	**• Interpret energy level diagrams** **• Correlate spectral lines with an energy level diagram.**

		• Resolve a vector into perpendicular components, both graphically and algebraically. • Determine the resultant of two or more vectors graphically or algebraically. • Draw scaled force diagrams using ruler and protractor. • Sketch theoretical path of a projectile. • Use vector diagrams to analyze mechanical systems.	• Determine the energy stored in a spring. • Determine that affect the period of a pendulum. • Observe energy conversions in real world situations. • Compare the power developed when the same work is done at different rate.	measurements to determine the resistance of a circuit element. • Interpret graphs of voltage versus current. • Measure and compare the resistance of conductors of various lengths and cross-sectional areas. • Construct simple series and parallel circuits. • Draw and interpret circuit diagrams	waves. • Differentiate between transverse and longitudinal. • Determine the speed of sound in air. • Predict the superposition of two waves interfering constructively and destructively. • Observe, sketch and interpret the behavior of wave fronts as they reflect, refract and diffract. • Draw	

		• Verify Newton's second law for linear motion. **• Determine the coefficient of friction for two surfaces.** **• Verify Newton's second law for uniform circular motion.** **• Verify conservation of momentum.** **• Determine the spring constant.**		**which include voltmeters and ammeters.** **• Predict the behavior of light bulbs in series and parallel circuits.** **• Map the magnetic field of a permanent magnet.**	**ray diagrams to represent the reflection and refraction of waves.** **• Determine empirically the index of refraction of a transparent medium.**	
Enduring Understanding *(The big ideas, the "why" we include these ideas)*	**1.Communication of scientific results is aided by a common**	**1. Measured quantities can be classified as vector or scalar.**	**1. Students will understand that when work is done on or by a**	**1. Students will understand that energy may be stored in electric or**	**1. Students will understand that an oscillating system**	**1. States of matter and energy are restricted to discrete values**

	standard of measure. **2. All measurement contains an element of uncertainty which can be estimated.** **3. Observations made while testing proposed explanations provide new insights into phenomena.** **4. Critical thinking skills and mathematical models are used in the solution of physical problems.**	**2. Combining vector and scalar quantities require different mathematical skills.** **3. An object in linear motion may travel with constant velocity or with acceleration.** **4. The path of a projectile is the result of the simultaneous effect of the horizontal and vertical components of its motion; these components act independently**	**system, there is a change in total energy of the system.** **2. Students will understand that all energy transfers are governed by the law of conservation of energy.** **3. Students will understand that kinetic energy is the energy an object possesses by virtue of its motion.** **4. Students will understand that potential energy is the energy an object**	**magnetic fields.** **2. Students will understand that moving electric charges produce magnetic fields.** **3. Students will understand that all materials display a range of conductivity. At constant temperature, common metallic conductors obey Ohm's Law.** **4. Students will understand that a circuit**	**produces waves that carry energy and information without transferring mass.** **2. Students will understand that the model of a wave incorporates the characteristics of amplitude, wavelength, frequency, period, wave speed and phase.** **3. Students will understand that mechanical waves require a material**	**(quantized).** **2. Charge is quantized on two levels. On the atomic level, charge is restricted to multiples of the elementary charge. On the subnuclear level, charge appears as fractional values of the elementary charge (quarks).** **3. On the atomic level, energy is emitted or absorbed in discrete packets called photons, and the energy of a photon is**

		. 5. According to Newton's Laws of Motion the presence of a net force on a system determines whether the system is in equilibrium or is accelerating. 6. The impulse imparted to an object causes a change in momentum and momentum is conserved in a closed system.	possesses by virtue of its position or condition. Types of potential energy include gravitational and elastic. 5. Students will understand that power is the time-rate at which work is done or energy is expended.	is a closed path in which a current can exist, and circuit components may be connected in series or in parallel. 5. Students will understand that electrical power and energy can be determined for an electric circuit.	medium through which to travel. 4. Students will understand that waves are categorized by the direction in which particles in a medium vibrate relative to the direction of propagation of the wave, such as transverse and longitudinal waves. 5. Students will understand that electromagnet	proportional to it frequency. 4. On the atomic level, energy and matter exhibit the characteristics of both waves and particles. 5. The Standard Model of Particle Physics has evolved from previous attempts to explain the nature of the atom. 6. The fundamental source of all energy in the universe is the conversion of

					ic radiation exhibits wave characteristics and can propagate through a vacuum. **6. Students will understand that when a wave strikes a boundary between two media, reflection, transmission and absorption occur, and a transmitted wave may be refracted due to a change in speed.** **7. Students will understand that diffraction**	**mass into energy.**

					occurs when waves pass by obstacles or through openings, and when waves of a similar nature meet, the resulting interference may be explained using the principle of superposition . **8. Students will understand that when a wave source and an observer are in relative motion, the observed frequency of the waves traveling between them is shifted**	

					(Doppler effect).	
Essential Questions *(What do we want students to think about)*	**1. What does it mean to prove a scientific theory or law?** **2. How do we use mathematics to help solve real physical problems?** **3. What makes one measurement better than another?**	**What causes motion?** **What are forces?** **What are the types of forces in nature?** **How can we predict the results of interactions?** **How can we describe motion in 2 dimensions?** **How can we predict motion in 2 dimensions?** **How can we describe motion in the world around**	**1. How is energy conservation revealed in the real world?** **2. In what ways do we witness the effects of something having energy?** **3. What design characteristics would you incorporate into a machine to make it more powerful?**	**1. How are electric fields created?** **2. How are electric fields used in everyday life?** **3. How can we predict the behavior of an electrical circuit?How are magnetic fields related to electric current?**	**1. How do wave behave when moving from one media to another.** **2. How can waves be used to detect information about your surroundings ?** **3. What are the parts of the electromagnetic spectrum and how are they used to improve the quality of our lives?**	**1. Under what circumstances does light behave as a wave, and under what circumstances does light behave as a particle.** **2. In what ways has radioactivity been harnessed for the benefit of mankind?** **3. Why does a neon sign emit orange light?** **4. What methods and equipment can be used to study particles that**

		us?				**are too small to be detected by the unaided eye?**