Course Name: Pre-AP physics

Team Names: Jon Collins

1st 9 Weeks	SOL Objectives	Vocabulary
Safety **1 DAY**		
Math **1 WEEK**		Unit conversion Scientific notation
Kinematics PH.5 The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes. Key concepts include a) linear motion; **3 WEEKS**		displacement velocity acceleration
Special Relativity PH.12 The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics. Key concepts may include e) relativity; **1 WEEK**		Time dilation Twin paradox Length contraction
Dynamics PH.5 The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes. Key concepts include d) Newton's laws of motion; **4 WEEKS**		Force Free body diagram Newton's laws

2nd Nine weeks	SOL Objectives	Vocabulary
2- Dim Motion (Projectile and Circular) PH.5 The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes. Key concepts include c) projectile motion; b) uniform circular motion e) gravitation; f) planetary motion; and PH.10 The student will investigate and understand how to use the field concept to describe the effects of gravitational, electric, and magnetic forces. Key concepts include a) inverse square laws (Newton's law of universal gravitation and Coulomb's law); and b) technological applications. **3 WEEKS**		Parabola Centripetal motion Centrifugal motion Kepler's Laws
Fluids ☹		
Momentum PH. 6 The student will investigate and understand that quantities including mass, energy, momentum, and charge are conserved. Key concepts include b) elastic and inelastic collisions; **2 WEEKS**		Momentum Impulse Elastic collision Inelastic collision
Work, Power, and Energy PH.5 The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes. Key concepts include g) work, power, and energy PH. 6 The student will investigate and understand that quantities including mass, energy, momentum, and charge are conserved. Key concepts include a) kinetic and potential energy; and c) mass/energy equivalence. PH.7 The student will investigate and understand that energy can be transferred and transformed to provide usable work. Key concepts include a) transfer and storage of energy among systems including mechanical, thermal, gravitational, electromagnetic, chemical, and nuclear systems; and b) efficiency of systems. PH.12 The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics. Key concepts may include c) matter/energy equivalence; **4 WEEKS**		Work Power Kinetic energy Potential energy Electrical energy Rest mass energy Fission fusion

3rd Nine Weeks	SOL Objectives	Vocabulary
	Typically Energy overlaps into the third nine weeks . . . Electricity PH.11 The student will investigate and understand how to diagram, construct, and analyze basic electrical circuits and explain the function of various circuit components. Key concepts include a) Ohm's law; b) series, parallel, and combined circuits; c) electrical power; and d) alternating and direct currents. PH.10 The student will investigate and understand how to use the field concept to describe the effects of gravitational, electric, and magnetic forces. Key concepts include a) inverse square laws (Newton's law of universal gravitation and Coulomb's law); and b) technological applications. **4 WEEKS**	Current Resistance Series Parallel Inverse square law
	Magnetism **2 WEEKS**	

4th 9 weeks	SOL Objectives	Vocabulary
	Waves PH.8 The student will investigate and understand wave phenomena. Key concepts include a) wave characteristics; b) fundamental wave processes; and c) light and sound in terms of wave models. **3 WEEKS**	Frequency Amplitude Period Wavelength
	Optics PH.9 The student will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum are phenomena ranging from radio waves through visible light to gamma radiation. Key concepts include a) the properties, behaviors, and relative size of radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays; b) wave/particle dual nature of light; and c) current applications based on the respective wavelengths. **4 WEEKS**	E/M spectrum Young's Exp.
	Nuclear Physics PH.12 The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics. Key concepts may include a) wave/particle duality; b) wave properties of matter; d) quantum mechanics and uncertainty; f) nuclear physics;	Radioactive decay Alpha, beta, and gamma particle superconductivity

g) solid state physics; h) nanotechnology; i) superconductivity; and j) radioactivity. **3 weeks**	
Lab Procedure and the nature of science PH.1 The student will plan and conduct investigations using experimental design and product design processes. Key concepts include a) the components of a system are defined; b) instruments are selected and used to extend observations and measurements; c) information is recorded and presented in an organized format; d) the limitations of the experimental apparatus and design are recognized; e) the limitations of measured quantities are recognized through the appropriate use of significant figures or error ranges; f) models and simulations are used to visualize and explain phenomena, to make predictions from hypotheses, and to interpret data; and g) appropriate technology, including computers, graphing calculators, and probeware, is used for gathering and analyzing data and communicating results. PH.2 The student will investigate and understand how to analyze and interpret data. Key concepts include a) a description of a physical problem is translated into a mathematical statement in order to find a solution; b) relationships between physical quantities are determined using the shape of a curve passing through experimentally obtained data; c) the slope of a linear relationship is calculated and includes appropriate units; d) interpolated, extrapolated, and analyzed trends are used to make predictions; and e) situations with vector quantities are analyzed utilizing trigonometric or graphical methods. PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning, and logic. Key concepts include a) analysis of scientific sources to develop and refine research hypotheses; b) analysis of how science explains and predicts relationships; c) evaluation of evidence for scientific theories; d) examination of how new discoveries result in modification of existing theories or establishment of new paradigms; and e) construction and defense of a scientific viewpoint. PH.4 The student will investigate and understand how applications of physics affect the world. Key concepts include a) examples from the real world; and b) exploration of the roles and contributions of science and technology. **THESE ITEMS ARE TAUGHT THROUGHOUT AS PART OF MOST UNITS AND NOT AS A SEPARATE UNIT.**	