KEANSBURG SCHOOL DISTRICT

KEANSBURG HIGH SCHOOL

Science Department

AP PHYSICS B CURRICULUM

September 2007

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AP Physics B Curriculum

College Physics by Serway, Faughn, Vuille, & Bennett; 7th Edition. Thomson Brooks/Cole, Belmont, CA , 2006

Timeline	Content Area	Materials/Resources	Labs/Technology	Assessment/Evaluation
10 days	**I. NEWTONIAN MECHANICS** (35% = 50 days) **A. Kinematics** (including vectors, vector algebra, components of vectors, coordinate systems, displacement, velocity, and acceleration) 1. Motion in one dimension	Textbook: *College Physics* by Serway, Faughn, et al. 7th Edition, Thomson Brooks/Cole, Belmont, CA, 2006 Textbook, pg 23-46 Problem set	Lab: **1-Dimensional Freefall:** developing a set of equations to predict position, velocity and acceleration of a free falling object; learn to derive information of slope and area under a graph; learn to apply error analysis	Lab report, demonstrate graphing data on excel, generate motion diagrams; homework problem sets; quiz and test
	2. Motion in two dimensions including projectile motion	Textbook: pg 53-71 Problem set	Lab: **2-dimensional Freefall:** demonstrate displacement, velocity and acceleration are vector quantities; predict the range and height of a projectile at arbitrary angle: determine angle that projectile reaches maximum range.	Lab report; homework problem sets; quiz, test on relative motion, projectile motion

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10 days	**I. NEWTONIAN MECHANICS (continued)** **B. Newton's laws of motion** 1. Static equilibrium (first law)	Textbook: pg 81-84 Problem set	Lab**: Forces in Equilibrium:** demonstrate force is a vector quantity, show opposite forces are equal when system is in equilibrium Lab**: Newton's Second Law**: demonstrate when an unbalanced force is applied to a mass the acceleration is directly proportional to and in the same direction as the force **Elevator:** explore the effect of acceleration on the apparent weight of an object. Lab: **Friction Force**; determine coefficient of static friction and what factors affect friction between surfaces	Lab report; homework problem sets; quiz, test
	2. Dynamics of a single particle (second law)	Textbook: pg 84-90 Problem set		Lab report; homework problem sets; quiz, test
	3. Systems of two or more bodies (third law)	Textbook: pg 90-100 Problem set		Video presentation and analysis

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7 days	**I. NEWTONIAN MECHANICS (continued)** **C. Work, energy, power** 1. Work and work-energy theorem 2. Forces and potential energy 3. Conservation of energy 4. Power	Textbook: pg 118-126 Problem set Textbook: pg 125-139 Problem set Textbook: pg 140-141 Problem set Textbook: pg 142-148 Problem set	Lab: **Work and Gravitational Energy**; measure work done by falling mass; understand gravitational potential energy and ability to do work due to height of object.	Lab Report; Homework ; quiz, test
7 days	**D. Systems of particles, linear momentum** 1. Impulse and momentum 2. Conservation of linear momentum, collisions	Textbook: pg 160-166 Problem set Textbook: pg 166-176 Problem set	Lab: **Conservation of Momentum**: show that momentum is conserved in closed system; compare elastic and inelastic collisions.	Lab Report: homework, quiz, test

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6 days	**I. NEWTONIAN MECHANICS (continued)** **E. Circular motion and rotation** 1. Uniform circular motion 2. Torque and rotational statics	Textbook Pg 189-206 Problem set Textbook Pg 226-236 Problem set	Lab: **Rotational Motion**; show equations for rotational motion are same form as linear motion. Lab: **Centripetal Acceleration**: determine relationship between centripetal force acting on object and mass, velocity and radius. Lab**: Torque and Equilibrium**: show torque is calculated by product of perpen-dicular distance from applied force and magnitude of force; demonstrate at equilibrium opposite torques and opposite forces are equal.	Lab report; homework, quiz, test Lab report; homework, quiz, test Lab report; homework, quiz, test

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10 days	**I. NEWTONIAN MECHANICS (continued)** **F. Oscillations and gravitation** 1. Simple harmonic motion (dynamics and energy relationships) 2. Mass on a spring 3. Pendulum and other oscillations 4. Newton's law of gravity 5. Orbits of planets and satellites	Textbook Pg 425-432 Problem set Textbook Pg 432-438 Problem set Textbook Pg 438-441 Problem set Textbook Pg 206-214 Problem set Textbook Pg 214-217 Problem set	Lab: **Hooke's Law and Energy Conservation:** show amount spring stretches is proportional to magnitude of applied force; demonstrate energy conserved by transforming Lab: **SHM: Pendulum Lab;** compare properties of single and double pendulums; calculate value for g, the acceleration due to gravity	Lab report; homework, quiz, test Homework, quiz Lab report; homework, quiz, test

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7 days	**II. FLUID MECHANICS AND THERMAL PHYSICS** (15% = 21 days) **A. Fluid Mechanics** 1. Hydrostatic pressure	Textbook Pg 266-282 Problem set	Lab: **Hydrostatic Pressure:** measure how pressure varies with depth.	Lab report; homework, quiz, test
	2. Buoyancy	Textbook Pg 282-288 Problem set	Lab: **Bouyancy:** demonstrate forces acting upon an immersed object.	Homework quiz
	3. Fluid flow continuity	Textbook Pg 288-291 Problem set		
	4. Bernoulli's equation	Textbook Pg 291-297 Problem set	Lab: **Bernoulli Lab**: observe and document behavior of materials that undergo a change in fluid velocity nearby.	Lab report homework, quiz, test

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7 days	**II. FLUID MECHANICS AND THERMAL PHYSICS (continued)** **B. Temperature and heat** 1. Mechanical equivalent of heat	Textbook Pg 352-353 Problem set	Lab: **Mechanical Equivalent of Heat**: Determine relationship between heat units and mechanical energy units.	Lab report, homework, quiz, test
	2. Heat transfer and thermal expansion	Textbook Pg 321-332 Textbook Pg 365-374 Problem set		
7 days	**C. Kinetic theory and thermodynamics** 1. Ideal gases A. Kinetic model	Textbook Pg 339-343 Problem set	Lab: **Kinetic Model:** demonstrate compressing gas effect on volume.	Lab report, homework, quiz, test
	B. Ideal gas law	Textbook Pg 334-339 Problem set	Virtual lab: **Ideal Gas Law**.	

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	C. Kinetic theory and thermodynamics (continued) 2. Laws of thermodynamics A. First law (including processes on pV diagrams) B. Second law (including heat engines)	Textbook Pg 386-399 Problem set Textbook Pg 399-413 Problem set		Homework, quiz, test

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	III. ELECTRICITY AND MAGNETISM (25% = 36 days)			
7 days	**A. Electrostatics** 1. Charge and Coulomb's law	Textbook Pg 497-504 Problem set	Lab: **Electrostatics:** explain interaction of charged and uncharged particles; find how intensity depends on distance between charged objects	Lab report, homework, quiz, test
	2. Electric field and electric potential (including point charges)	Textbook Pg 505-514 Problem set		homework, quiz, test
7 days	**B. Conductors, capacitors, dielectrics** 1. Electrostatics with conductors			
	2. Capacitors A. Capacitance	Textbook Pg 531-544 Problem set		Draw pV diagrams, homework quiz
	B. Parallel plate	Textbook Pg 545-547 Problem set		Draw pV diagrams, homework quiz

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	III. ELECTRICITY AND MAGNETISM (continued)			
7 days	**C. Electric circuits** 1. Current, resistance, power 2. Steady-state direct current circuits with batteries and resistors only 3. Capacitors in circuits	Textbook Pg 568-582 Problem set Textbook Pg 592-604 Textbook Pg 604-610 Problem set Textbook Pg 624-631 Problem set	**Lab: DC Circuits**: apply electric laws to simple circuits.	Lab report, homework, quiz, test homework, quiz, test
8 days	**D. Magnetic Fields** 1. Forces on moving charges in magnetic fields 2. Forces on current-carrying wires in magnetic fields 3. Fields of long current-carrying wires	Textbook Pg 631-634 Problem set Textbook Pg 640-643 Problem set Textbook Pg 660-673 Problem set	**Lab: Magnetic Deflection:** observe magnetic field generated by moving charge. Lab**: Magnetic Inductance**: design a solenoid and demonstrate inductance	Lab report, homework, quiz, test Lab report, homework, quiz, test

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7 days	**III. ELECTRICITY AND MAGNETISM (continued)** **E. Electromagnetism** 1. Electromagnetic induction (including Faraday's law and Lenz's law)	Textbook Pg 441-450 Problem set		Homework, quiz, test

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7 days	**IV. WAVES AND OPTICS** (15% = 21 days) **A. Wave motion (including sound)** 1. Traveling waves 2. Wave propagation 3. Standing waves 4. Superposition	Textbook Pg 726-736 Problem set Textbook Pg 736-738 Problem set	**Lab: Measuring Speed of Sound** **Lab: Standing Waves**: predict behavior of standing wave	Lab report, homework, quiz, test homework, quiz, Lab report, homework, quiz, test
7 days	**B. Physical optics** 1. Interference and diffraction 2. Dispersion of light and the electromagnetic spectrum	Textbook Pg 739-745 Problem set Textbook Pg 754-765 Problem set Textbook Pg 765-779 Problem set	**Lab: Thin Film Interference** : Demonstrate wave nature of light **Lab: Prisms:** demonstrating electromagnetic spectrum	Lab report, homework, quiz, test Lab report, homework, quiz, test homework, quiz

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7 days	**IV. WAVES AND OPTICS (continued)** **C. Geometric optics** 1. Reflection and refraction 2. Mirrors 3. Lenses	Textbook Pg 874-886 Problem set Textbook Pg 874-886 Problem set Textbook Pg 887-889 Problem set	**Virtual lab: Lens Lab** Or Webquest: ***Vision*.** **Lab: Lenses:** show how lens forms image and explain mathematics of lenses.	Lab report, homework, quiz, test Lab report, homework, quiz, test

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7 days	**V. ATOMIC AND NUCLEAR PHYSICS** (10% = 14 days) **A. Atomic physics and quantum effects** 1. Photons, the photoelectric effect, Compton scattering, x-rays 2. Atomic energy levels 3. Wave-particle duality	Textbook Pg. 955-958 Problem set	Website: **The Particle Adventure** Fundamentals, the Standard Model **Virtual Lab:** Applet: **Bohr atom**	Lab report, homework, quiz, test Homework quiz Lab report, homework, quiz, test
9 days	**B. Nuclear physics** 1. Nuclear reactions (including conservation of mass number and charge) 2. Mass-energy equivalence	Textbook Pg. 860-862	**Virtual Lab: Dual Nature of Light** **Lab: Half-life** **Lab: Background radiation and radioactive decay;**	Lab report, homework, quiz, test Lab report, homework, quiz, test Quiz, test

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22 days 3 days 3 days 2 days	**REVIEW FOR AP PHYSICS EXAM** **REVIEW OF AP PHYSICS OPEN-ENDED QUESTIONS FROM EXAM FOLLOWING EXAM** **REVIEW FOR FINAL EXAM** **FINAL EXAM** **(Class meets five days/week for 80 minute blocks)**			