Teacher: CORE AP	
Physics	Year: 2016-17
Course: AP Physics	Month: All Months

S Kinematics and

Forces

e							_	
þ	Essential Questions How can we describe motion mathematically?	Content Displacement, Velocity, Acceleration and Time	Knowledge and Skills Use physics concepts to mathematically model a situation and arrive at a prediction.	Vocabulary position,displacement, velocity, acceleration, derivative, integral, mass, inertia, net force	Assessments IYPT Labs	Lessons	Resources Halliday, Resnick and Walker text chapters 1-6	Standards 3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
t	What causes changes in motion to occur?	Calculus (derivatives, mostly)	Define terms such as displacement, velocity, acceleration, mass, inertia and force.		Quiz 1 Kinematics + Forces		Coursesites	3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
e		Vector Independence/vect or components	Explain phenomena using physics concepts.					3.1.12.C-Assess and apply patterns in science and technology.
n	1	Projectile Motion						3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
b		Mass and Inertia						3.1.12.E-Evaluate change in nature, physical systems and man made systems.
e		Forces						3.2.12.A-Evaluate the nature of scientific and technological knowledge.
r								3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.
								3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.
								3.2.12.D-Analyze and use thetechnological design process to solveproblems.3.4.12.A-Apply concepts about the
								structure and properties of matter.

3.4.12.C-Apply the principles of motion and force.

3.7.12.A-Apply advanced tools, materials and techniques to answer complex guestions.

3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems.

O Forces and Work

С	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
t	What causes objects to change their motion?	Forces	Explain phenomena using physics concepts.	Centripetal force, work, power, kinetic energy, potential energy	IYPT Labs		HRW text: 6-8	3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
0	How can we determine what a person or machine is capable of doing?	Calculus (derivates and integrals)	Use physics concepts to mathematically model a situation and arrive at a prediction.		Quiz 2 Forces and Work		Coursesites	3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
b		Circular Motion and Centripetal Forces						3.1.12.C-Assess and apply patterns in science and technology.
e		Work						3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
r		Simple Machines						3.1.12.E-Evaluate change in nature, physical systems and man made systems.
								3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.
								3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.

3.2.12.D-Analyze and use the technological design process to solve problems.

3.4.12.A-Apply concepts about the structure and properties of matter.
3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature.
3.4.12.C-Apply the principles of motion and force.

3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.

3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems.

Energy and

Momentum

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Kinematics	Differentiate between and apply appropriately the conservation laws (energy and momentum).	Kinetic Energy, Potential Energy, Momentum, Impulse	IYPT Labs		HRW text: 9-11	3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
What happens to energy and momentum in collisions and other interactions?	Forces	Calculate the moment of inertia for a variety of objects		Quiz 3 Energy and Momentum			3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
	Work			Exam 1.1 Cumulative kinematics - momentum		Coursesites	3.1.12.C-Assess and apply patterns in science and technology.

Energy (Kinetic, Potential, Spring)

Momentum and impulse

Conservation Laws (Energy and Momentum)

Calculus

Exam 1.2 --Cumulative kinematics momentum Retest on exams 3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.

3.1.12.E-Evaluate change in nature, physical systems and man made systems.

3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.

3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.

3.2.12.D-Analyze and use the technological design process to solve problems.

3.4.12.A-Apply concepts about the structure and properties of matter.
3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature.
3.4.12.C-Apply the principles of motion and force.

3.6.12.C-Analyze physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.

3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.

3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems.

```
N Electric Fields
```

Content	Knowledge and Skills	Vocabulary	Assessments	essons Resources	Standards
Electric Charge	Draw electric field lines for a variety of charge arrangements.	Electrict Charge, Coulomb's Law, E-field, Equipotential Lines, electric potential,	IYPT Labs	HRW text: 21-23	3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
Electric Fields	Solve for electric fields using Gauss' Law on a variety of symmetries.	Gaussian Surfaces, charge density	Quiz 4 Electrostatics and Gauss'	Coursesites	3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
Gauss' Law	Solve for electric forces and fields using Coulomb's Law and integral calculus.				3.1.12.C-Assess and apply patterns in science and technology.
Electric Field Lines					3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
Forces					3.1.12.E-Evaluate change in nature, physical systems and man made systems.
Energy					3.2.12.A-Evaluate the nature of scientific and technological knowledge.3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.
					3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.
					3.2.12.D-Analyze and use the technological design process to solve problems.
					 3.4.12.A-Apply concepts about the structure and properties of matter. 3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature. 3.4.12.C-Apply the principles of motion and force.
	Content Electric Charge clactric Fields Gauss' Law Electric Field Lines Forces Energy	ContentKnowledge and SkillsElectric ChargeDraw electric field lines for a variety of charge arrangements.Electric FieldsSolve for electric fields using Gauss' Law on a variety of symmetries.Gauss' LawSolve for electric forces and fields using Coulomb's Law and integral calculus.Electric Field LinesEnergy	ContentKnowledge and SkillsVocabularyElectric ChargeDraw electric field lines for a variety of charge arrangementsElectrict Charge, Culomb's Law, E-field, Equipotential Lines, electric potential, Gaussian Surfaces, charge densityElectric FieldsSolve for electric fields using Gauss' Law on a variety of symmetries. Goulomb's Law and integral calculus.Gaussian Surfaces, charge densityElectric Field LinesSolve for electric forcesHermite Surfaces, charge densityForcesForcesForces	Content Knowledge and Skills Vocabulary Assessments Electric Charge Draw electric field Electrict Charge, IYPT Labs IYPT Labs Lines for a variety of charge arrangements. Equipotential Lines, electric potential, Gaussian Surfaces, Law on a variety of symmetries. Quiz 4 Electric Fields Solve for electric forces and fields using Coulomb's Law and integral calculus. Culomb's Law Culiz 4 Electric Field Lines Forces Electric Field Lines Forces	Content Knowledge and Skills Vocabulary Assessments Lessons Resources Electric Charge Draw electric field lines for a variety of charge arrangements. Electric tharge, coulomb's Law, E-field, charge arrangements. Field NPT Labs HRW text: 21-23 Electric Fields Solve for electric fields using Gauss' Law on a variety of symmetries. Gaussian Surfaces, charge density Quiz 4 Coursesites Gauss' Law Solve for electric forces and fields using Coulomb's Law and integral calculus. Solve for electric forces and fields using Coulomb's Law and integral calculus. Vield Viel

3.4.12.D-Analyze the essential ideas about the composition and structure of the universe.

3.7.12.A-Apply advanced tools, materials and techniques to answer complex guestions.

3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.

3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems.

3.8.12.A-Synthesize and evaluate the interactions and constraints of science and technology on society.

D Potential,

Capacitance and Resistance in Circuits

е							
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons Resources	Standards
С	How does Electric Potential relate to energy and electric	Electric Charge	Draw equipotential lines on e-Field maps	Equipotential Lines, Electric Potential, Capacitance, dielectric,	IYPT Labs	HRW text: 24-27	3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
	fields?			resistance, resistivity			
e	How can we determine properties of a R or RC circuit?	Electric Field Lines	Solve for electric potential given forces, energy or fields		Circuit Labs	Coursesites	3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
m		Electric Fields	Solve for capacitance based on physical features of the capacitor, including dielectrics.		Quiz 5 electric potential / capacitance		3.1.12.C-Assess and apply patterns in science and technology.
b		Energy	Solve for currents and voltages across resistors using Ohm's Law or Kirchoff's Laws		Quiz 6 circuits		3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.

Gauss' Law Solve RC circuits and be able to apply the time constant. Forces Calculus

Work

3.1.12.E-Evaluate change in nature, physical systems and man made systems.

3.2.12.A-Evaluate the nature of scientific and technological knowledge.3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.

3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.

3.2.12.D-Analyze and use the technological design process to solve problems.

3.4.12.A-Apply concepts about the structure and properties of matter.
3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature.
3.4.12.C-Apply the principles of motion and force.

3.4.12.D-Analyze the essential ideas about the composition and structure of the universe.

3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.

3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems.

r

J Potential,

Capacitance and Re

a								
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons Resource	es	Standards
r	How does Electric Potential relate to energy and electric fields?	Electric Charge	Draw equipotential lines on e-Field maps	Equipotential Lines, Electric Potential, Capacitance, dielectric, resistance, resistivity	Exam 2.1 Electrostaics - Circuits	HRW tex	t: 24-27	3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
ι	How can we determine properties of a R or RC circuit?	Electric Field Lines	Solve for electric potential given forces, energy or fields		Exam 2.2 Electrostatics - Circuits			3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
ā		Electric Fields	Solve for capacitance based on physical features of the capacitor, including dielectrics.		Retest on exams 2.1, 2.2	Coursesi	tes	3.1.12.C-Assess and apply patterns in science and technology.
r		Energy	Solve for currents and voltages across resistors using Ohm's Law or Kirchoff's Laws					3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
У		Gauss' Law	Solve RC circuits and be able to apply the time constant.		Midterm on 1st semester			3.1.12.E-Evaluate change in nature, physical systems and man made systems.
		Forces						3.2.12.A-Evaluate the nature of scientific and technological knowledge.
		Calculus						3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.
		Work						3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.
								3.2.12.D-Analyze and use the technological design process to solve problems.3.4.12.A-Apply concepts about the structure and properties of matter.

3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature. 3.4.12.C-Apply the principles of motion and force. 3.4.12.D-Analyze the essential ideas about the composition and structure of the universe. 3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions. 3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes. 3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems. 3.7.12.D-Evaluate the effectiveness of

computer software to solve specific

problems.

Rotational Motion

Eccontial Questions	Contont	Knowlodgo and Skills	Vocabulary	Assossments	Lossons	Posourcos	Standards
	Kinemeties	Differentiate heture	Vicabulary	Assessments	Lessons		2.1.12. A Apply concents of systems
what causes objects	KINEMATICS	Differentiate between	Kinetic Energy,	INPT Labs		HKW text: 9-11	3.1.12.A-Apply concepts of systems,
to change their		and apply	Potential Energy,				subsystems, feedback and control to solve
motion, whether it be		appropriately the	Momentum, Impulse,				complex technological problems.
linear or rotational?		conservation laws	Torque, Angular				
		(energy and	Momentum, Moment				
		momentum).	of Inertia				
What happens to	Forces	Calculate the moment		Quiz 7			3.1.12.B-Apply concepts of models as a
energy and		of inertia for a variety		Rotational			method to predict and understand
momentum in		of objects		Motion			science and technology.
collisions and other		,					
interactions?							
interactions.	Work	Use torque force				Coursesites	3 1 12 C-Assess and apply patterns in
	WORK	momentum energy				coursesties	science and technology
		oto to overlain					science and technology.
		etc to explain					
		phenomena and solve					
		problems.					
	Energy (Kinetic,						3.1.12.D-Analyze scale as a way of relating
	Potential, Spring)						concepts and ideas to one another by
							some measure.

Momentum and impulse

Conservation Laws (Energy and Momentum)

Torque

Moment of Inertia

Angular Momentum

Calculus

3.1.12.E-Evaluate change in nature, physical systems and man made systems.

3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.

3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.

3.2.12.D-Analyze and use the technological design process to solve problems.

3.4.12.A-Apply concepts about the structure and properties of matter.
3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature.
3.4.12.C-Apply the principles of motion and force.

3.6.12.C-Analyze physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.

3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.

3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems. F Gravity and Simple

Harmonic Motion

e								
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
b	How are objects able to oscillate?	Angular Momentum	Use all the concepts of mechanics to model, explain and solve problems related to Gravity and planetary motion	Universal Gravitation, density, simple harmonic motion, periodic motion, frequency, angular frequency	Quiz 8 Gravity and SHM		HRW text: 13 + 15	3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
r	How are bodies able to orbit or escape gravitational fields?	Calculus	Use all the concepts of mechanics to model, explain and solve problems related to simple harmonic motion, including physical pendulums		IYPT Labs		Coursesites	3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
u		Circular Motion and Centripetal Forces			Exam 3.1 All of Mechanics			3.1.12.C-Assess and apply patterns in science and technology.
а		Conservation Laws (Energy and Momentum)			Exam 3.2 All of Mechanics			3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
r		Energy (Kinetic, Potential, Spring)			Retest on all of mechanics			3.1.12.E-Evaluate change in nature, physical systems and man made systems.
у		Forces						3.2.12.A-Evaluate the nature of scientific and technological knowledge.
		Kinematics						3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.
		Mass and Inertia						3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.
		Moment of Inertia						3.2.12.D-Analyze and use the technological design process to solve problems.
		Momentum and						3.4.12.A-Apply concepts about the
		impulse						structure and properties of matter.

Projectile Motion

Torque

Work

Universal Gravity

Simple Harmonic Motion (pendulums, springs) 3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature. 3.4.12.C-Apply the principles of motion and force.

3.4.12.D-Analyze the essential ideas about the composition and structure of the universe.

3.6.12.C-Analyze physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.

3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.

3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems.

M Magnetism

a					
	Essential Questions	Content	Knowledge and Skills Vocabulary	Assessments Lessons Resources	Standards
r	What gives rise to	Magnetic Forces	Draw magnetic field	e/m apparatus	3.1.12.A-Apply concepts of systems,
	magnetic fields?	and Fields	lines for currents	experiment	subsystems, feedback and control to solve complex technological problems.
С	How can magnetic	Biot-Savart Law	Solve for magnetic	Magnetic Field	3.1.12.B-Apply concepts of models as a
	fields induce currents?		fields and forces for currents	Mapping	method to predict and understand science and technology.
h	How do RCL circuits work?	Induction	Solve for the forces on moving charged	RCL Circuit Lab	3.1.12.C-Assess and apply patterns in science and technology.
			particles in magnetic		
			TIEIOS		

Right-Hand-Rule	Solve for induced emf	Quiz 9 magnetism	3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure
Calculus	Explain and solve RCL		3.1.12.E-Evaluate change in nature,
	circuits in terms of SHM		physical systems and man made systems.
Electric Charge			3.2.12.A-Evaluate the nature of scientific
			and technological knowledge.
Electric Field Lines			3.2.12.B-Evaluate experimental
			information for appropriateness and
			adherence to relevant science processes.
Electric Fields			3.2.12.C-Apply the elements of scientific
			inquiry to solve multi-step problems.
Energy			3.2.12.D-Analyze and use the
			technological design process to solve
			problems.
Energy (Kinetic,			3.4.12.A-Apply concepts about the
Potential, Spring)			structure and properties of matter.
Gauss' Law			3.4.12.B-Apply and analyze energy
			sources and conversions and their
			relationship to heat and temperature.
Forces			3.4.12.C-Apply the principles of motion and force.
Mass and Inertia			3.4.12.D-Analyze the essential ideas about
			the composition and structure of the
Simple Harmonic			3 7 12 A-Apply advanced tools materials
Motion			and techniques to answer complex
(nendulums			questions
springs)			questions.
Work			3.7.12.B-Evaluate appropriate
			instruments and apparatus to accurately
			measure materials and processes.
			3.7.12.C-Evaluate computer operations

and concepts as to their effectiveness to solve specific problems.

3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems.

А	M	a	gn	et	isn
•••		~	<u>.</u>		

Α	Magnetism						
р							
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons Resources	Standards
r	What gives rise to	Magnetic Forces	Draw magnetic field	magnetism, induction,	e/m apparatus	HRW text: 28-32	3.1.12.A-Apply concepts of systems,
	magnetic fields?	and Fields	lines for currents	self-inductance, mutual	experiment		subsystems, feedback and control to solve
				inductance, inductors,			complex technological problems.
i	How can magnetic	Biot-Savart Law	Solve for magnetic	Lorentz Force, Hall	Magnetic Field	Coursesites	3.1.12.B-Apply concepts of models as a
	fields induce		fields and forces for	Effect	Mapping		method to predict and understand
	currents?		currents				science and technology.
I	How do RCL circuits	Induction	Solve for the forces on		RCL Circuit Lab		3.1.12.C-Assess and apply patterns in
	WORK?		moving charged				science and technology.
			fields				
		Pight Hand Pula	Solve for induced emf		Quiz 10		2 1 12 D Analyza scala as a way of relating
		Nght-hand-hule	Solve for induced entit				concents and ideas to one another by
					maactanee		some measure
		Calculus	Explain and solve RCL				3.1.12.E-Evaluate change in nature.
			circuits in terms of				physical systems and man made systems.
			SHM				
		Electric Charge					3.2.12.A-Evaluate the nature of scientific
							and technological knowledge.
		Electric Field Lines					3.2.12.B-Evaluate experimental
							information for appropriateness and
							adherence to relevant science processes.
		Electric Fields					3.2.12.C-Apply the elements of scientific
							inquiry to solve multi-step problems.
		Energy					3.2.12.D-Analyze and use the
							technological design process to solve
							problems.
		Energy (Kinetic,					3.4.12.A-Apply concepts about the
		Potential, Spring)					structure and properties of matter.
		Gauss' Law					3.4.12.B-Apply and analyze energy
							sources and conversions and their
		Forces					3 4 12 C-Apply the principles of motion
		101003					and force.
		Mass and Inertia					3.4.12.D-Analyze the essential ideas about
							the composition and structure of the
							universe.

	Simple Harmonic Motion (pendulums, springs)					3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.
	Work					3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.
						3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.3.7.12.D-Evaluate the effectiveness of computer software to solve specific problems.
Review Unit						
Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments Lessons	Resources	Standards
How do forces and energy affect objects?	Angular Momentum	Calculate the moment of inertia for a variety of objects	No New Vocab just review for AP test	Practice Exams (Numerous)	College Board website (free exams/solutions)	3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
	Biot-Savart Law	Define terms such as displacement, velocity, acceleration, mass, inertia and force.				3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
	Calculus	Differentiate between and apply appropriately the conservation laws (energy and momentum).				3.1.12.C-Assess and apply patterns in science and technology.
	Circular Motion and	Draw electric field				3.1.12.D-Analyze scale as a way of relating
	Centripetal Forces	lines for a variety of charge arrangements.				concepts and ideas to one another by some measure.
	Conservation Laws	Draw equipotential				3.1.12.E-Evaluate change in nature.
	(Energy and Momentum)	lines on e-Field maps				physical systems and man made systems.
	Displacement, Velocity, Acceleration and Time	Draw magnetic field lines for currents				3.2.12.A-Evaluate the nature of scientific and technological knowledge.

Electric Charge	Explain and solve RCL	3.2.12.B-Evaluate experimental
	circuits in terms of	information for appropriateness and
	SHM	adherence to relevant science processes.
Electric Field Lines	Explain phenomena	3.2.12.C-Apply the elements of scientific
	using physics	inquiry to solve multi-step problems.
	concepts.	
Electric Fields	Solve for capacitance	3.2.12.D-Analyze and use the
	based on physical	technological design process to solve
	features of the	problems.
	capacitor, including	
	dielectrics.	
Energy	Solve for currents and	3.4.12.A-Apply concepts about the
	voltages across	structure and properties of matter.
	resistors using Ohm's	
	Law or Kirchoff's Laws	
Energy (Kinetic,	Solve for electric	3.4.12.B-Apply and analyze energy
Potential, Spring)	fields using Gauss	sources and conversions and their
	Law on a variety of	relationship to heat and temperature.
-	symmetries.	
Forces	Solve for electric	3.4.12.C-Apply the principles of motion
	forces and fields using	and force.
	Coulomb's Law and	
	integral calculus.	
Gauss' Law	Solve for electric	3.4.12.D-Analyze the essential ideas about
	potential given forces,	the composition and structure of the
	energy or fields	universe.
Induction	Solve for induced emf	3 7 12 A-Annly advanced tools materials
induction		and techniques to answer complex
		questions
Kinematics	Solve for magnetic	3 7 12 B-Evaluate appropriate
Kinematics	fields and forces for	instruments and appropriate
	currents	measure materials and processes
		measure materials and processes.
Magnetic Forces	Solve for the forces on	3.7.12.C-Evaluate computer operations
and Fields	moving charged	and concepts as to their effectiveness to
	particles in magnetic	solve specific problems.
	fields	
Mass and Inertia	Solve RC circuits and	3.7.12.D-Evaluate the effectiveness of
	be able to apply the	computer software to solve specific
	time constant.	problems.

Moment of Inertia	Use all the concepts of mechanics to model, explain and solve problems related to Gravity and planetary motion
Momentum and impulse	Use all the concepts of mechanics to model, explain and solve problems related to simple harmonic motion, including physical pendulums
Projectile Motion	Use physics concepts to mathematically model a situation and arrive at a prediction.
Right-Hand-Rule	Use torque, force, momentum, energy, etc to explain phenomena and solve problems.
Simple Harmonic	
Motion	
(pendulums,	
springs) Simple Machines	
Torque	
Universal Gravity	
Vector	
Independence/vect	
Work	

Knowledge and Skills Vocabulary

of inertia for a variety Reviewing for AP test

Angular Momentum Calculate the moment No new Vocab --

of objects

Standards 3.1.12.A-Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.

Lessons Resources

College Board

Website -- free

tests and

solutions

Assessments

(Numerous)

Practice Exams

M Review Unit

y How do forces and

energy affect

objects?

Content

Biot-Savart Law	Define terms such as displacement, velocity, acceleration, mass, inertia and force	3.1.12.B-Apply concepts of models as a method to predict and understand science and technology.
Calculus	Differentiate between and apply appropriately the conservation laws (energy and momentum)	3.1.12.C-Assess and apply patterns in science and technology.
Circular Motion and Centripetal Forces	Draw electric field lines for a variety of charge arrangements.	3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
Conservation Laws (Energy and Momentum)	Draw equipotential lines on e-Field maps	3.1.12.E-Evaluate change in nature, physical systems and man made systems.
Displacement, Velocity, Acceleration and Time	Draw magnetic field lines for currents	3.2.12.A-Evaluate the nature of scientific and technological knowledge.
Electric Charge	Explain and solve RCL circuits in terms of SHM	3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.
Electric Field Lines	Explain phenomena using physics concepts.	3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.
Electric Fields	Solve for capacitance based on physical features of the capacitor, including dielectrics.	3.2.12.D-Analyze and use the technological design process to solve problems.
Energy	Solve for currents and voltages across resistors using Ohm's Law or Kirchoff's Laws	3.4.12.A-Apply concepts about the structure and properties of matter.
Energy (Kinetic, Potential, Spring)	Solve for electric fields using Gauss' Law on a variety of symmetries.	3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature.

Forces	Solve for electric	3.4.12.C-Apply the principles of motion
	Contexts and fields using	and force.
	Coulomb's Law and	
	integral calculus.	
Gauss' Law	Solve for electric	3.4.12.D-Analyze the essential ideas about
	potential given forces,	the composition and structure of the
	energy or fields	universe.
Induction	Solve for induced emf	3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.
Kinematics	Solve for magnetic	3.7.12.B-Evaluate appropriate
	fields and forces for	instruments and apparatus to accurately
	currents	measure materials and processes.
Magnetic Forces	Solve for the forces on	3.7.12.C-Evaluate computer operations
and Fields	moving charged	and concepts as to their effectiveness to
	particles in magnetic	solve specific problems.
	fields	
Mass and Inertia	Solve RC circuits and	3.7.12.D-Evaluate the effectiveness of
	be able to apply the	computer software to solve specific
	time constant.	problems.
Moment of Inertia	Use all the concepts	
	of mechanics to	
	model, explain and	
	solve problems	
	related to Gravity and	
	planetary motion	
Momentum and	Use all the concepts	
impulse	of mechanics to	
	model, explain and	
	solve problems	
	related to simple	
	harmonic motion,	
	including physical	
	pendulums	
Projectile Motion	Use physics concepts	
	to mathematically	
	model a situation and	
	arrive at a prediction.	

Right-Hand-Rule	Use torque, force,
	momentum, energy,
	etc to explain
	phenomena and solve
	problems.
Simple Harmonic	
Motion	
(pendulums,	
springs)	
Simple Machines	
Torque	
Universal Gravity	
Vector	
Independence/	
vector components	
Work	