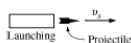
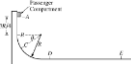
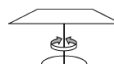
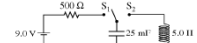


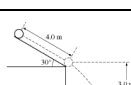

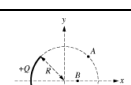
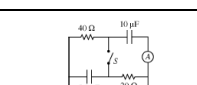
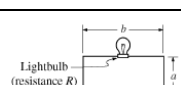


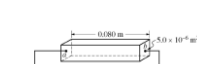




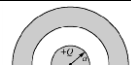

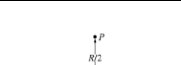
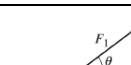
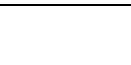

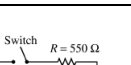
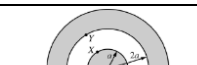

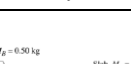
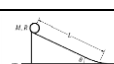
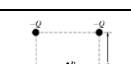
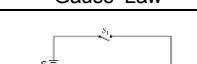
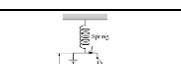

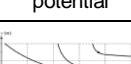
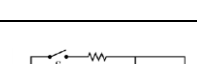

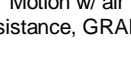
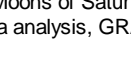

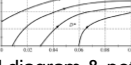
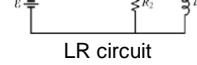
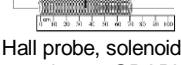


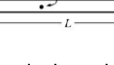



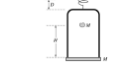
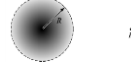
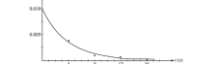

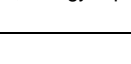
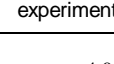
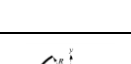
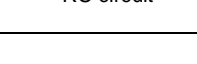
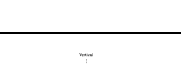

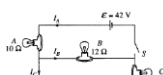

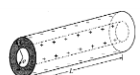
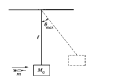

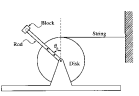
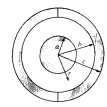
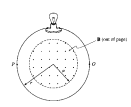
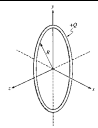
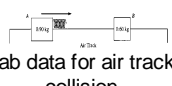




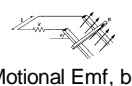
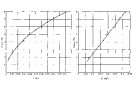
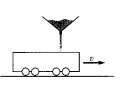
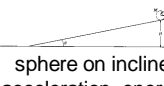

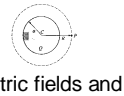
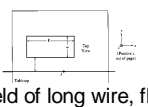
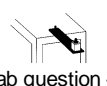

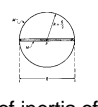


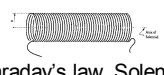

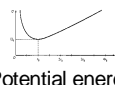

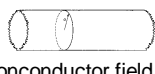


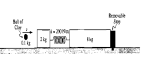

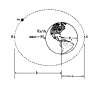

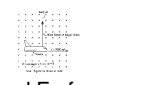
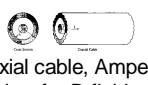


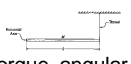
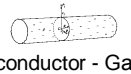
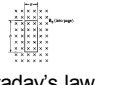
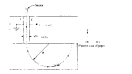

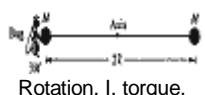
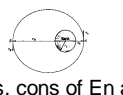
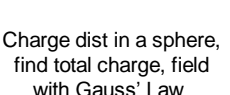
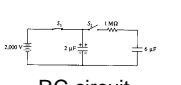
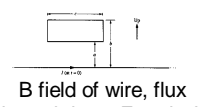
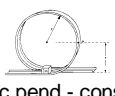
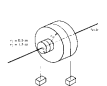
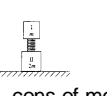
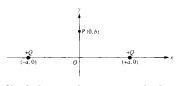
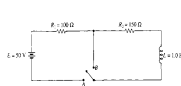
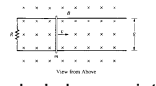
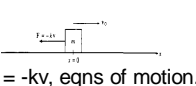
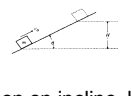
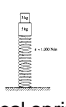

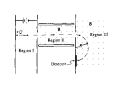
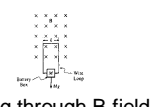
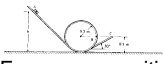



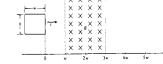



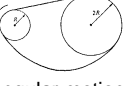

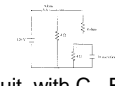
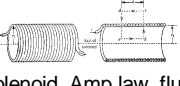

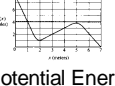
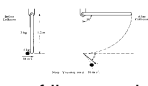
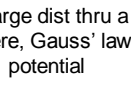

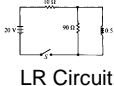

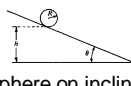
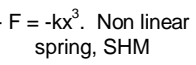
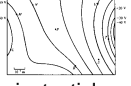
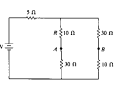
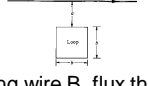
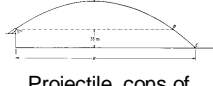
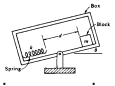
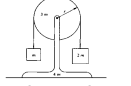
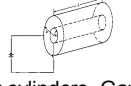

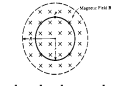


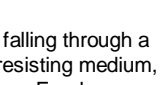

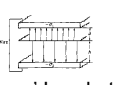
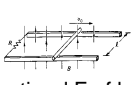
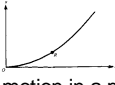



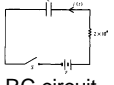

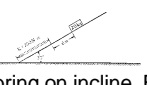
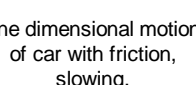

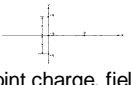
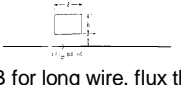
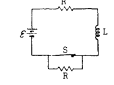


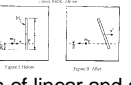

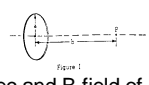


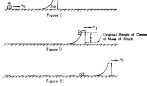
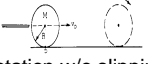
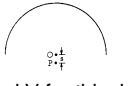
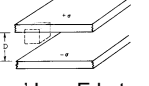



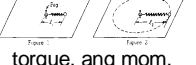



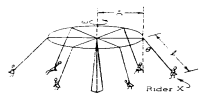
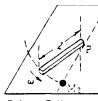
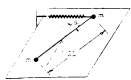
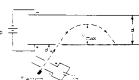
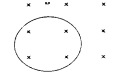

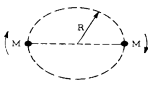
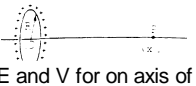
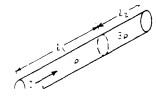
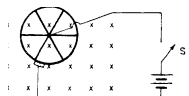
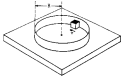
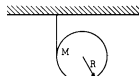
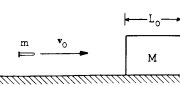
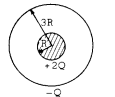
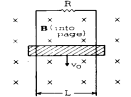
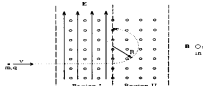
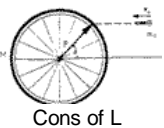

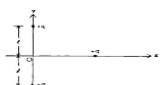
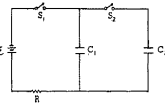

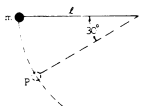
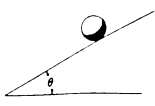
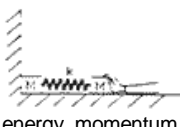


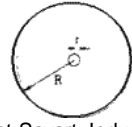
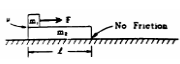

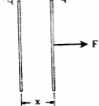
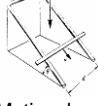


AP Physics C Free-Response Index

		M1	M2	M3	E1	E2	E3
2011	rubric	 Impulse-momentum	 Freefall ride.	 Torsional pendulum	Gauss' Law – spheres and shells	 RC – LC circuits	 Ampere's Law
2010	rubric	 Coffee filter lab	 Rotation	 Mechanics	 Field and Potential	 RC circuit	 EM induction
2009	rubric	Potential energy function and graphs	 Physical pendulum from hell	 Modified Atwood's machine	$V(r) = -\frac{Q_0}{4\pi\epsilon_0 R} \left[-2 + 3\left(\frac{r}{R}\right)^2 \right] \text{ for } r < R$ $V(r) = -\frac{Q_0}{4\pi\epsilon_0 r} \text{ for } r > R$ Continuous charge distribution	 Circuit, Hall effect	 Faraday's Law - circuits
2008	rubric	 Inclined plane $F = kv$	 Torque - strut	 Hooke's Law – Force and Energy	 Gauss' Law	 Circuits – RC, LC, RR	 Biot-Savart Law
2007	rubric	 Linear dynamics	 Orbital mechanics	 Mechanical Energy Conservation; spring	 RC circuit	 Gauss' Law	 Faraday's Law
2006	rubric	 Linear dynamics	Non-linear spring, data analysis, GRAPH, energy conservation	 Rot'l kinematics, projectile	 Electrostatics – field and potential	 RC circuit	 Spring, B force on a current loop, induction
2005	rubric	Motion w/ air resistance, GRAPH	Moons of Saturn: Data analysis, GRAPH	 Rotational dynamics	 Field diagram & potential	 LR circuit	 Hall probe, solenoid, experiment, GRAPH
2004	rubric	 Energy, inelastic collision, projectile	 Rot'l dynamics, experiment	 Physical pendulum	 E Field & potential – Gauss' Law	 RC Circuit	 Flux, induction
2003	rubric	 Work, energy & power	 Spring, SHM, inelastic collision	 Catapult, projectiles, experiment	 E Field – Gauss' Law	 RC circuit	 Induction
2002	rubric	$v = \frac{8}{1+5t}$ Collision and calculus kinematics	 Energy: grav., rot., spring	$U(x) = \frac{4.0}{2.0+x}$ Graphical U vs x, $F = -dU/dx$, exper.	 E field, potential, F, energy	 RC circuit, experiment	 Flux and Induction, energy dissipated
2001	rubric	 mass and force sensor - imp-momentum, acc	Gravity, satellite motion.	 angular motion, rot inertia	 fields, potential, thunder	 res of capacitors, dielect.	 mag field of wire, forces.

		M1	M2	M3	E1	E2	E3
2000	rubric	Lab, pendulum, find g, elevator.	Ball falling thru resistive medium, $F = -bv^2$, energy	 F=ma, angular motion	 LR - RC circuits	 fields and potential	 Gauss and Ampere
1999	rubric	 Lab - ballistic pendulum	 Hole through earth - SHM	 Rotational Eq, Energy	 Spherical Capacitor	 Induction	 E field, potential, static ch
1998	rubric	 lab data for air track collision.	 inelastic coll, linear and ang mom. C of M motion.	 two body motion, friction, force diagrams	 Coulomb, $F=qE$, forces.	 Circuit, RC, LR	 Motional Emf, bar sliding down incline, term vel.
1997	rubric	 non-linear spring, lab question	 inelastic momentum - calculus treatment	 sphere on incline, acceleration, energy	 graphical analysis of circuit - experimental battery	 electric fields and forces - flux	 B field of long wire, flux, motional emf.
1996	rubric	 Lab question - vibrations - Gravitation	 forklift - eqns of motion, friction	 Mom of inertia of rod, hoop. Rota	 Concentric spheres - E field, V	 RC Circuit	 Faraday's law, Solenoid
1995	rubric	 Impulse, momentum, projectile.	 Potential energy function	 grav, orbits, ang momentum, moment of Inertia.	 Nonconductor field and potential	 Capacitors, RC Circuit	 Air track - Motional Emf, Lenz' Law
1994	rubric	 Cons of En and mom, spring	 rolling w/o slipping, cons of energy on an incline.	 orbits, cons of energy and ang mom.	 E field, potential - ring and part of ring.	 Motional Emf, energy conservation	 Coaxial cable, Amperes law for B field.
1993	rubric	 En in a spring, friction, cons of en.	 resistive medium, equations of motion.	 torque, angular acceleration.	 non conductor - Gauss' law. conductor, Ampere's law	 Faraday's law, magnetic forces, induced I.	 Mass Spectrometer.
1992	rubric	 Energy, cons of mom, inelastic	 Rotation, I, torque, energy	 Orbits, cons of En and ang mom.	 Charge dist in a sphere, find total charge, field with Gauss' Law.	 RC circuit	 B field of wire, flux through loop, Faraday's law
1991	rubric	 Ballistic pend - cons of En and Mom - Vertical Circle	 Rotation, torque	 Spring, cons of mom and en, elastic collision	 field and potential of point charges	 LR circuit	 Faraday's law, resisting medium
1990	rubric	 $F = -kv$, eqns of motion.	 motion on incline, box and sphere. energy.	 vertical spring, oscillation, energy	 conc spheres, Gauss' Law, fields	 Mass spectrometer	 Falling through B field, induction, term velocity.

		M1	M2	M3	E1	E2	E3
1989	rubric	 Energy cons, critical speed, vert circle	 several bodies, heavy pulley, acc	 vert spring, SHM.	 Two charges, E and potential	 Motional Emf, induced current	 RC circuit.
1988	rubric	 car on banked curve	 springs in parallel, work = area in F vs d	 Angular motion, torque, acceleration	 conc shells, Gauss' law, potential, Capacit.	 Circuit, with C. Energy dissipated.	 Solenoid, Amp law, flux induced Emf.
1987	rubric	 Centrip forces on a swing	 Potential Energy function. $F = -dU/dr$	 Cons of linear and ang momentum	 Charge dist thru a sphere, Gauss' law, potential	 Flux, Faraday's law, induced I, energy dissipated	 LR Circuit.
1986	rubric	 platform acc upward. Power	 sphere on incline, I, acceleration.	 $-F = -kx^3$. Non linear spring, SHM	 Equipotentials and fields, work	 Circuit, add C, add L.	 Long wire B, flux thru nearby loop, induced I
1985	rubric	 Projectile, cons of momentum	 spring on an incline, energy cons	 Atwoods mach, eqns of motion.	 coax cylinders, Gauss' law, cylindrical capacitor	 Circuits, RC	 Faraday's law, induced Emf, E.
1984	rubric	 Centripetal motion, force diagram	 Orbits, mom cons, energy.	 falling through a resisting medium, $F = -kmv$	 E and B forces on moving charge.	 Gauss' Law betw parallel plates.	 motional Emf bar decelerates. Power
1983	rubric	 proj motion in a plane	 rotation, acceleration	 skier on snowball	 conc shells, Gauss' Law, potential	 RC circuit	 Superimposed B fields from wires.
1982	rubric	 spring on incline, En cons	 one dimensional motion of car with friction, slowing.	 torque, I, rotation equations	 point charge, field, potential, flux	 B for long wire, flux thru loop nearby	 R-L circuit
1981	rubric	 Incline, trans eq, friction	 Energy on a swing	 Cons of linear and ang momentum.	 Gauss' Law, spherical capac., dielectrics	 Elec and B field of a ring of charge	 Faradays Law, induced Emf, I, power
1980	rubric	 spring, SHM	 Momentum & En Conservation	 Rotation w/o slipping, eqns of motion	 E and V for thin, bent rod.	 Gauss' Law E between plates, Capacitance	 Faraday's Law, induced Emf and E
1979	rubric	 Projectile, en cons, mom cons.	 Ferry, cons of momentum, impulse	 torque, ang mom, SHM w spring during rotation	 conc shells, Gauss' law, E vs r, V vs r	 non-cond slab, E field, cond slab, B field.	 B fields and forces on particles. hand rules.

		M1	M2	M3	E1	E2	E3
1978	rubric	 circular, work	 linear and ang mom	 torque, ang mom, SHM w spring	 E,B forces on elect, V and vector v	 Faraday's, Lenz's Law, energy	 Gauss E&V, C, U_C
1977	rubric	$F = -kv$, work	Rotation, "walk the dog" yo-yo trick	 Binary stars M, 2M	 E and V for on axis of ring	 Gauss's law on resistor	 B force, torque
1976	rubric	 circ motion, , friction, tangential a, kinematics	 rotation,	 energy, momentum	 Gauss E and V	 Induced emf	 Mass spectrometer
1975	rubric	falling through a resisting medium $F = -kv$ Graph drawing	 Cons of L	 Calculus, force, work done lifting chain	 Coulomb U,F, Work	 Equilibrium Capac.	 Induction in square due to dl/dt in wire
1974	rubric	 circ motion, energy, force, tangential a	 rotation, change μ	 energy, momentum, SHM	 Gauss E and V	 Parallel plate capacitor, E, Q, C, copper insert	 Biot-Savart, Induced emf
1973	solution	 Two block system w/ friction	Work-energy theorem	 Angular mechanics	 Parallel plate capacitor	Magnetic effects	 Motional emf
1972	solution	This year's free-response section contained two-parts: Part A contained five "major" questions and four "minor" problems.					
1971	solution	This year's free-response section contained two-parts: Part A contained five "major" questions and four "minor" problems.					
1970	solution	This year's free-response section contained two-parts: Part A contained five "major" questions and four "minor" problems.					