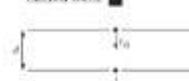
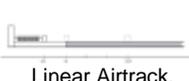
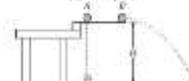
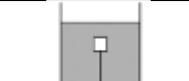
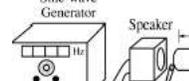
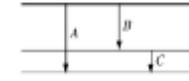
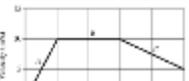
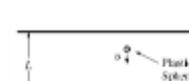
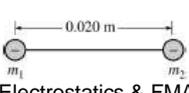
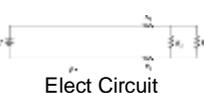
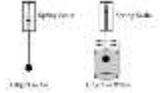
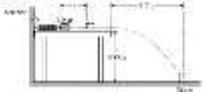
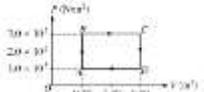
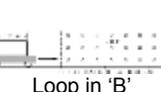
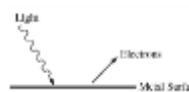
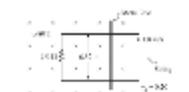
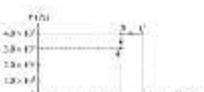
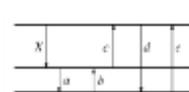
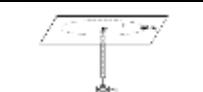
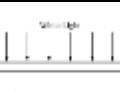
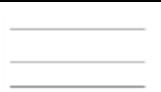
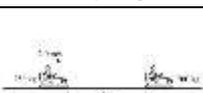
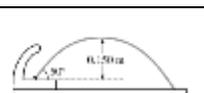
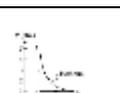
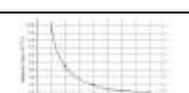
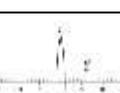
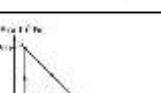
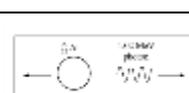
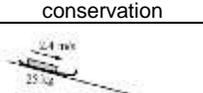
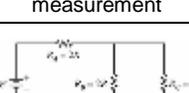
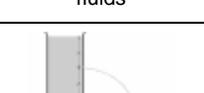
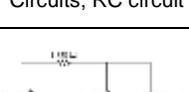
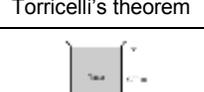
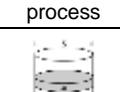
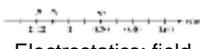
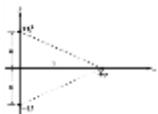
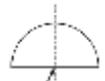
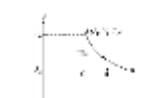
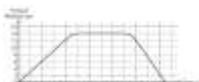
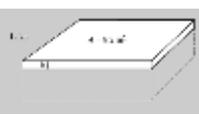
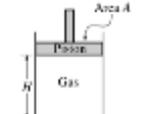
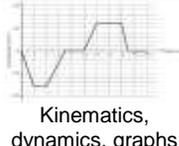
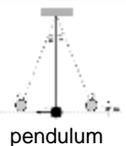
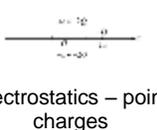
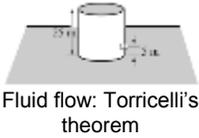
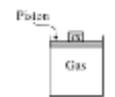
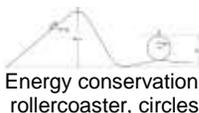
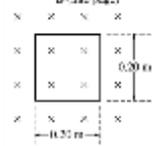
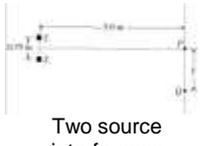
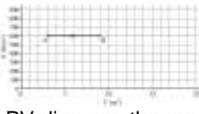
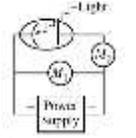
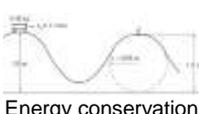
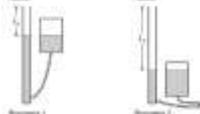
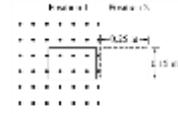
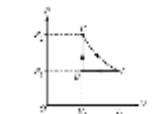
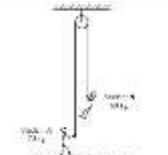
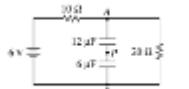
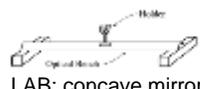
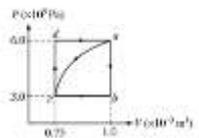
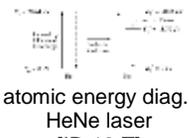
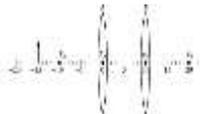
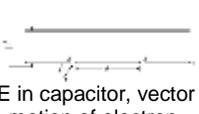
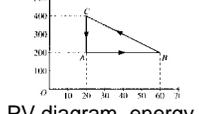
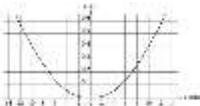
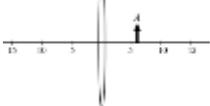
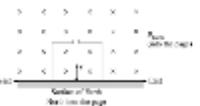
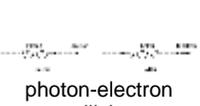
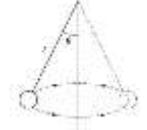
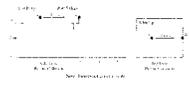
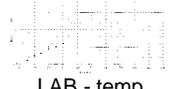
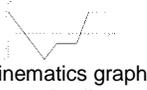
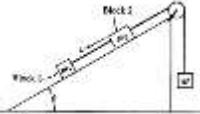
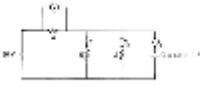
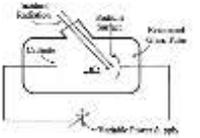
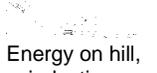
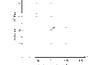
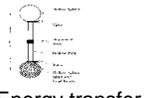
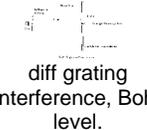
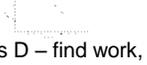
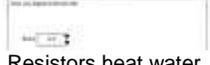
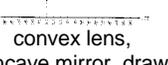


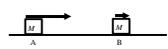
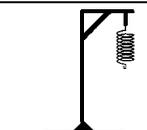
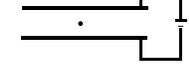
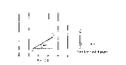
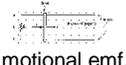
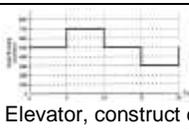
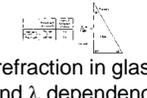
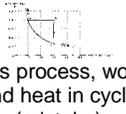
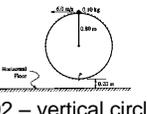
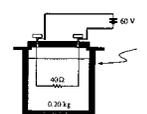
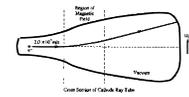
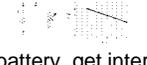
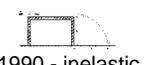
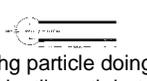
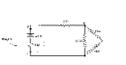
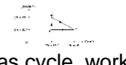
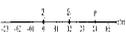
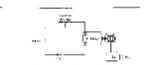
## AP Physics B Free-Response Index

	B1	B2	B3	B4	B5	B6	B7	B8	
2015 AP2	 Refraction & TIR	 Lightbulb Circuit LAB	 Ideal Gas Laws, Moveable Piston, & graphing	 E between plates					
2015 AP1	 Newton's Laws	Lightbulb Circuit LAB	 Linear Airtrack, graphing Energy	 Freefall, Graphing Projectile	 Oscillations & Wave Properties				
2014	 Pendulum, Energy, MV	 Density, Forces, Buoyancy	 PVNERT, PV Diagram	 Electrostatics & Fields	 Mag Field, Hooke's Law	 Photoelectric Effect	 Thin Film Interference		
2013	 Buoyancy, Tension	Mass & Spring Oscillation	 Refraction, Graphing	 Atwood Machine, Projectile	Thermo: Internal Energy of Gas	 2 Wires, B Field	 Electron Energy Levels		
2012	 FMA	 Freefall, MV	 Pressure, Fluids	 PT&PV Diagrams	 Circuit	 Wave LAB Set-up	De Broglie & Fission		
2011B	 Force & Work	Electric Field LAB	 Sound Diffraction	 Buoyancy in Air	 Q motion in B-Field	 Energy Transitions			
2011	 Accel, Force, Work	 EI Potential	 Narrow Slit LAB	 Buoyancy	 Millikan Oil Drop	Energy Transitions			

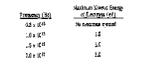
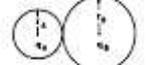
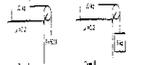
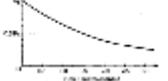
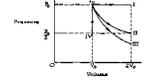
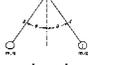
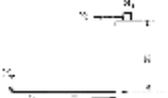
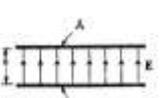
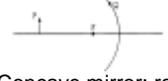
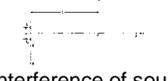
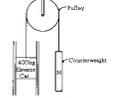
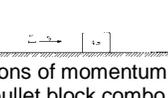
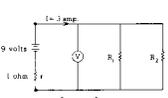
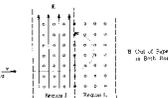
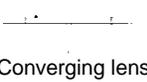
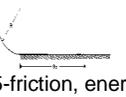
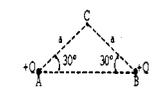
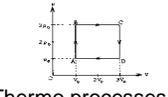
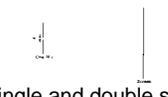
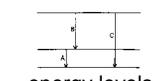
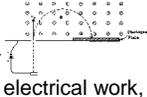
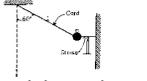
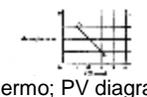
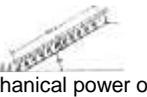
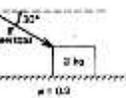
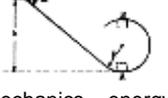
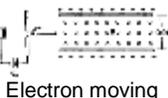
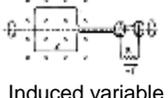
	B1	B2	B3	B4	B5	B6	B7	B8
2010B	 E Conservation	 LAB - Pendulum	 Electrostatics & FMA	 Elect Circuit	 Diffraction	 Buoyancy	 Photoelectric Eff	
2010	 Energy & Projectile	 Buoyancy & Graphing	 Electrostatics	 PVNERT	 Refraction	 Loop in 'B'	 Photoelectric Eff	
2009B	 Energy Cons & Graphing	 Electrostatics	 B Field w/wire	 PVNERT	 Buoyancy	 Diffraction	 Photoelectric Eff	
2009	 Centripetal & Graphing	 Charge in B	 Fluids/Pressure	 PVNERT	 Refraction & Interference	 Electron E levels		
2008	 Collisions	 Springs & Energy	 Current balance	 Fluids & projectiles	 Thermo cycle	 Mirror – ray diagrams	deBroglie wavelength; photoelectric effect	
2008B	 Momentum conservation	 Mechanics; springs	 LAB: magnetic field measurement	 fluids	 Lens – ray diagrams	 Thermo cycle	 Nuclear radiation	
2007	 Dynamics; inclined plane	 Mass spectrometer	 Circuits; RC circuit	 Torricelli's theorem	 Thermo; isobaric process	LAB: determine the focal length of a lens, plot data	Positron-electron pair annihilation	
2007B	 dynamics	 q moving thru a B field	 RC circuit	 Torricelli's theorem	 Thermo; isometric process	LAB: determine the index of refraction of a slab of glass' plot data	Pair production	

	B1	B2	B3	B4	B5	B6	B7	B8
2006	 Dynamics; modified Atwood's w/ spring	LAB: World class runner – 100 m dash	 Electrostatics; field and potential	Snell's Law; graphical derivation of $n$ ; Thin film interference	 Thermo; PV diagram	Energy of photon; wave properties of an electron		
2006B	 LAB: graphical derivation of $g$	 Energy, momentum conservation; friction dynamics	 Electrostatics	 Reflection/refraction; Double slit interf.	 Thermo; PV diagram	deBroglie wavelength; Electron/positron annihilation		
2005	 Kinematic, dynamics & graphs	 pendulum	 Electrostatics – point charges	LAB: double slit interference	 buoyancy	 PV=nRT graph	 Energy levels; Photoelectric effect	
2005B	 Kinematics, dynamics, graphs	 pendulum	 Electrostatics – point charges	LAB: two source interference	 Fluid flow: Torricelli's theorem	 PV=nRT graph	Photons and Photoelectric effect	
2004	 Energy conservation, rollercoaster, circles	Pressure and depth; Newton's laws	 Faraday's Law	 Two source interference	 PV-diagram, thermo	 LAB: Photoelectric effect		
2004B	 Energy conservation, rollercoaster, circles	Pressure and depth; Newton's laws	 LAB: Standing waves in tube	 Faraday's Law	 PV-diagram, thermo	 Compton scattering		
2003	 $F = ma$ , accel, FN,	 R and C in circuit	 Rail Gun: FB, work-energy	 LAB: concave mirror image	 PV diagram, energy	Fluids: pressure-depth, gauge pressure, Archimedes's Princ.	 atomic energy diag., HeNe laser [ID-10-T]	
2003B	 $F = ma$ , kinematics	LAB: circuit to power motor	 single & double lens	 E in capacitor, vector motion of electron,	 PV diagram, energy	 Bernoulli's princ., power, fluid flow	Atomic energy diagram, range of visible light	

	B1	B2	B3	B4	B5	B6	B7	B8
2002	 F=ma, impulse, kinematics	 U vs. x, energy, proj.motion,	Two light bulbs, rated in Watts, in series and parallel	 converging lens with virtual image then with real image	 B and E fields on proton	 LAB: spring and Archimedes' Principle	 photon-electron collision	
2002B	 Collision with impulse kinematics and energy	 conical pendulum, projectile motion	 light bulbs in series and parallel	 submarine window as mirror, lens	 capacitor E, V, C, electron released: find F, energy	Canister of gas: $nC\Delta t$ , $mC\Delta t$ , $PV=nRT$ , ht. of fusion	LAB: deBroglie wavelengths, atomic energy diagrams	
2001	 Circular motion, projectile	 momentum, projectile	 electrical forces, fields, potential	 wavelength dependent refraction	 LAB - temp dependent resistor used as thermometer	 gas thermo - types of processes.	nuclear reaction, mass defect.	
2000	 Kinematics graph, projectile	 Incline, forces, friction.	 RC circuit. dielectric	 refraction, thin film.	 Photoelectric effect	LAB: determine specific heat of liquid.	 Elec, Mag field on particle. Mass spectrometer.	
1999	 Kinematics, work, en, friction	 CRT, electron projectile in E field. B field	 Energy on hill, induction	 radioactive decay, half life	 centripetal force on a turntable	Refraction and diffraction Lab experiments – design	 Gas cycle, heat engine	
1998	 acceleration on table, projectiles	 force on charged particle in E field.	 LAB: Energy transfer by GPE. Specific heat	 Bulbs in circuit. Drawing, Ohms law.	 Standing waves on a string.	 ball swinging directions of V and a	 diff grating interference, Bohr level.	146 B forces on wire and particle.
1997	 F vs D – find work, etc.	 LAB: Centripetal force	 Spring, force on current in B field.	 Resistors heat water, draw circuit, analysis	 convex lens, concave mirror, draw and calculate	A – discuss experiment, pick from 3.	 energy levels	

	B1	B2	B3	B4	B5	B6	B7	B8
1996	 <p>Elastic and inelastic collision on air track</p>	 <p>LAB: Hooke's law</p>	 <p>Double slit interference</p>	 <p>Ohm's law</p>	<p>alpha decay, energies, momentum</p>	 <p>Millikan experiment</p>	 <p>gas in a can, PVNRT</p>	
1995	<p>Air track, inelastic collision, energy in spring</p>	 <p>toaster circuit, hooking up.</p>	 <p>Acceleration on a roller coaster.</p>	 <p>Energy level diagram, de Broglie</p>	<p>Heat engine, Carnot efficiency, power</p>	 <p>resonance in a tube.</p>	 <p>B force on electron.</p>	
1994	 <p>Kick soccer ball over fence – proj.</p>	 <p>arc track, energy ideas, friction work</p>	 <p>A: photoelectric effect graph; B: relativistic motion.</p>	 <p>work to acc electrons, control by B field</p>	 <p>path of light in water, TIR, lens under water.</p>	 <p>motional emf, induced E, Lenz's Law</p>		
1993	 <p>Elevator, construct d, v, a graphs given F</p>	 <p>E fields &amp; Potential of point charge</p>	 <p>control chgd particle with B &amp; E fields</p>	 <p>refraction in glass and <math>\lambda</math> dependence</p>	 <p>gas process, work and heat in cycle (mistake)</p>	 <p>X ray tube, Compton scattering</p>		
1992	 <p>1992 – vertical circle, tension, centripetal motion, energy</p>	<p>conservation of momentum, energy, during collision and separation.</p>	 <p>elec power, fusion, heat flow</p>	 <p>Energy level diagram, transitions</p>	 <p>CRT, E, B, field on electron</p>	 <p>convex lens, concave mirror, diagram &amp; calc's</p>		
1991	 <p>1991 – monkey static equilibrium, centripetal accel</p>	 <p>control of charge with E &amp; B fields.</p>	<p>Heat engine, eff, heat absorption by water.</p>	 <p>battery, get intern resistance, ohm's law, draw circuit</p>	<p>Nuclear alpha decay, equation, de Broglie <math>\lambda</math>, energy, Rutherford scattering</p>	 <p>2 slit interference, photoelectric work function</p>		
1990	 <p>1990 - inelastic collision projectile</p>	 <p>chg particle doing projectile path betw charged plates</p>	 <p>ohm's law, power</p>	 <p>gas cycle, work done, efficiency</p>	<p>accelerated elect. Resulting e-m waves, energy</p>	 <p>reflection, refraction, thin film interference.</p>		
1989	 <p>1989 -Centripetal motion, projectile.</p>	 <p>electric force, potential, work</p>	 <p>electrical – mechanical energy equivalence, Ohm</p>	 <p>PV diagram, work done in various processes</p>	 <p>convex lens, image formation, graph di vs do</p>	<p>Nuclear decay, energy, rest mass.</p>		

	B1	B2	B3	B4	B5	B6	B7	B8
1988	1988 - helicopter vertical acceleration, tension, kinematics	ball bounce, energy lost, specific heat.	RC circuit, beginning & end	B field of wire, force on moving charged particle	refraction, crit angle, new medium	Photoelectric effect, calculations		
1987	Modified Atwood's machine	forces, field, potential of point charges.	Heat movement, specific heat	Ohm's law, $Q=It$	refraction, speed, critical angle	Photoelectric effect, graphical calc		
1986	1986 - Atwood's mach, tension, acceleration	Energy in spring, projectiles	Circuits, ohm's law	Induction, forces on wire in B field	Carnot cycle, PV diagram	Concave & convex lenses		
1985	1985 – ballistic pendulum	static equilibrium, acceleration on incline, energy conv	e field, work, energy, forces	Specific heat, flow, phase change.	double slit interference in air and water.	energy level transitions, photons		
1984	1984 - vertical circle, projectile	momentum cons, elastic coll. angles	heating water, change of state, time, ohm's law, power.	e – m forces on chg part.	refraction, thin film interference	radioactive decay, half life, alpha		
1983	1983 – friction, $F = ma$ , tipping	inelast coll, energy in spring, shm.	ohms law, circuit	thermo processes work	concave mirror	Photoelectric effect, calculations of h, work function . . .		
1982	sprinter, kinematics graph.	upward acceleration, tension in cables	swing on rope, tension at lowest point, energy	Hookup of clock and radio.	flux, induction	convex lens	four modern phys experiments – choose 1 and explain	
1981	1981 – friction, work, energy	springs, energy, momentum cons in explosion	stat equil of charged particle in electric field	circuits – power, ohm's law	convex lenses, ray diagrams	Energy absorption, specific heat.		

	B1	B2	B3	B4	B5	B6	B7	B8
1980	 <p>1980 - static equilibrium</p>	 <p>circuits and connections</p>	 <p>photoelectric eff. Data and graph</p>	<p>Using one graph, sketch its companion</p>	 <p>Nuclear decay, cons of MV, calc of energy</p>	 <p>kin theory, pressure</p>		
1979	 <p>1979 – potential &amp; Kinetic energy of projectile</p>	 <p><math>F = ma</math></p>	 <p>muons, modern physics, <i>relativity</i></p>	 <p>electric &amp; magnetic forces on charged particles</p>	 <p>gas laws, p-v diagram, work</p>	 <p>refraction</p>	 <p>Charged spheres, elec forces.</p>	
1978	 <p>Vertical circular motion</p>	 <p>Projectile; inelastic collision</p>	 <p>capacitor</p>	 <p>Induced emf</p>	 <p>Concave mirror; ray diagram</p>	<p>Photon collision with mass</p>	<p>Bohr model; deBroglie wavelength</p>	
1977	<p>work-energy, kinematics</p>	 <p>centripetal force, banked road.</p>	 <p>e-m forces, work, fields</p>	 <p>Ohm's law, power, spec ht, thermo</p>	 <p>Interference of sound waves. 2 pt sources</p>	<p><i>Relativity</i> and modern physics – sketching graphs</p>		
1976	 <p>Elevator; Atwood's machine</p>	 <p>Cons of momentum; bullet block combo</p>	 <p>circuits</p>	 <p>Mass spectrometer</p>	<p>Waterfall: MGH converted to Q</p>	 <p>Converging lens Ray diagram</p>	<p>Photoelectric effect</p>	
1975	 <p>1975-friction, energy, kinematics</p>	 <p>electric field, work</p>	 <p>Thermo processes, gas laws</p>	 <p>single and double slit interference</p>	 <p>energy levels, transitions, photons</p>	 <p>electrical work, centripetal motion, mass spectrometer.</p>	 <p>pendulum, shm, energy, centripetal.</p>	
1974	 <p>Pendulum; dynamics</p>	<p>Electron moving in a B field</p>	<p>Converging lens Ray diagram</p>	<p>Experiment: determine # of photons/sec in a light beam</p>	 <p>Electrostatics; lines of equipotential</p>	 <p>Thermo; PV diagram</p>	 <p>Mechanical power of ski lift</p>	
1973	 <p>Mechanics – friction</p>	 <p>Mechanics – energy &amp; vertical circles</p>	 <p>Electron moving through E &amp; B fields</p>	 <p>Induced variable current</p>	<p>Calorimetry - GRAPH</p>	<p>Standing waves in pipes</p>	<p>Wave-particle duality of radiation and matter</p>	

	B1	B2	B3	B4	B5	B6	B7	B8
1972	This year's free-response section contained two-parts: Part A contained five "major" questions and seven "minor" questions.							
1971	This year's free-response section contained two-parts: Part A contained five "major" questions and seven "minor" question.							
1970	This year's free-response section contained two-parts: Part A contained five "major" questions and seven "minor" question.							