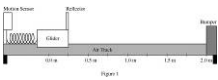

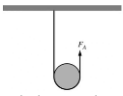
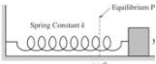
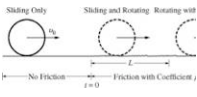

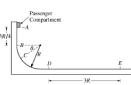
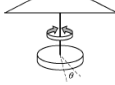

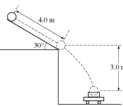


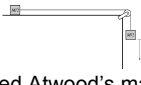
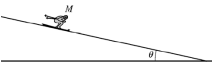
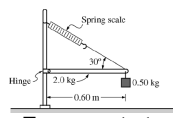

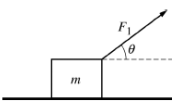

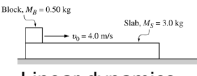
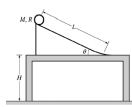
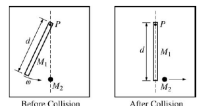
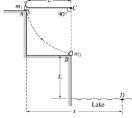
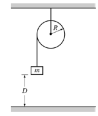
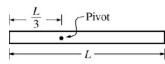
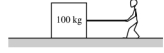

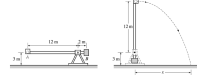
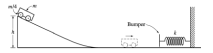






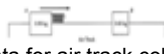



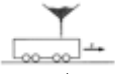
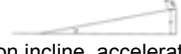




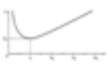








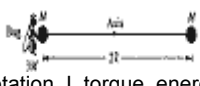




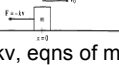


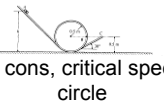
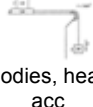


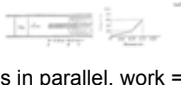


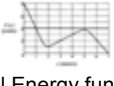


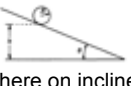
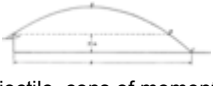




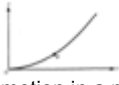


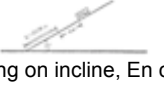

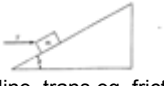
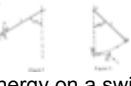




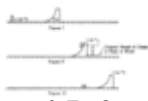
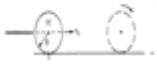



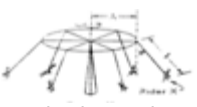
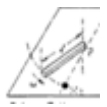
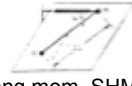
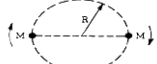

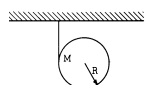
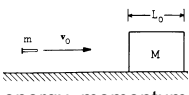
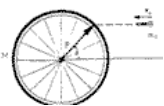

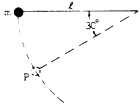
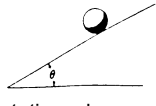
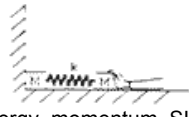
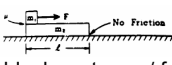
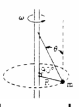
AP Physics C Free-Response Index--from M. Lietz

*BB=Black Box problems for Word 2007-8 in single-year files—use multiple-year files

	M1	M2	M3
2017	Experimental Newton's second law/Atwood machine	Energy & SHM	Energy conservation and rotational dynamics
2016	Forces, and experimental analysis	Momentum and energy	Rotational motion and rotational inertia
2015	Kinematics and energy	Momentum energy	Rotational inertia and experimental Pendulum
2014	Potential energy, conservation of TME and Impulse. Experimental analysis	Energy, circular motion, using differential equations to find v	Conservation of linear and angular momentum. Friction as net force.
2013	 Kinematics graphing Spring energy, SHM	 Drag force $F_D = kv$	 Rotational dynamics, energy
2012	 SHM kinematics, w/o and w friction	Design experiment of potential to kinetic energy. Experimental discrepancies.	 Rolling w slipping
2011	 Impulse-momentum	 Freefall ride.	 Torsional pendulum
2010	 Coffee filter lab	 Rotation	 Mechanics
2009	Potential energy function and graphs	 Physical pendulum	 Modified Atwood's machine
2008	 Inclined plane $F = kv$	 Torque - strut	 Hooke's Law – Force and Energy
2007	 Linear dynamics	Orbital mechanics Mars Surveyor0	 Mechanical Energy Conservation; spring
2006*BB	 Linear dynamics	Non-linear spring, data analysis, GRAPH, energy conservation	 Rot'l kinematics, projectile
2005*BB	Motion w/ air resistance, GRAPH	Moons of Saturn: Data analysis, GRAPH	 Rotational dynamics

	M1	M2	M3
2004*BB	 <p>Energy, inelastic collision, projectile</p>	 <p>Rot'l dynamics, experiment</p>	 <p>Physical pendulum</p>
2003*BB	 <p>Work, energy & power</p>	 <p>Spring, SHM, inelastic collision</p>	 <p>Catapult, projectiles, experiment</p>
2002*BB	$v = \frac{8}{1 + 5t}$ <p>Collision and calculus kinematics</p>	 <p>Energy: grav., rot., spring</p>	$U(x) = \frac{4.0}{2.0 + x}$ <p>Graphical U vs x, $F = -dU/dx$, exper.</p>
2001	 <p>mass and force sensor - imp-momentum, acc</p>	<p>Gravity, satellite motion.</p>	 <p>angular motion, rot inertia</p>
2000	<p>Lab, pendulum, find g, elevator.</p>	<p>Ball falling thru resistive medium, $F = -bv^2$, energy</p>	 <p>$F=ma$, angular motion</p>
1999	 <p>Lab - ballistic pendulum</p>	 <p>Hole through earth - SHM</p>	 <p>Rotational Eq, Energy</p>
1998	 <p>lab data for air track collision.</p>	 <p>inelastic coll, linear and ang mom. C of M motion.</p>	 <p>two body motion, friction, force diagrams</p>
1997	 <p>non-linear spring, lab question</p>	 <p>inelastic momentum - calculus treatment</p>	 <p>sphere on incline, acceleration, energy</p>
1996	 <p>Lab question – vibrations - Gravitation</p>	 <p>forklift - eqns of motion, friction</p>	 <p>Mom of inertia of rod, hoop. Rota</p>
1995	 <p>Impulse, momentum, projectile.</p>	 <p>Potential energy function</p>	 <p>grav, orbits, ang momentum, moment of Inertia.</p>
1994	 <p>Cons of En and mom, spring</p>	 <p>rolling w/o slipping, cons of energy on an incline.</p>	 <p>orbits, cons of energy and ang mom.</p>
1993	 <p>En in a spring, friction, cons of en.</p>	 <p>resistive medium, equations of motion.</p>	 <p>torque, angular acceleration.</p>

	M1	M2	M3
1992	 Energy, cons of mom, inelastic	 Rotation, I, torque, energy	 Orbits, cons of En and ang mom.
1991	 Ballistic pend - cons of En and Mom - Vertical Circle	 Rotation, torque	 Spring, cons of mom and en, elastic collision
1990	 $F = -kv$, eqns of motion.	 motion on incline, box and sphere. energy.	 vertical spring, oscillation, energy
1989	 Energy cons, critical speed, vert circle	 several bodies, heavy pulley, acc	 vert spring, SHM.
1988	 car on banked curve	 springs in parallel, work = area in F vs d	 Angular motion, torque, acceleration
1987	 Centrip forces on a swing	 Potential Energy function. $F = -dU/dr$	 Cons of linear and ang momentum
1986	 platform acc upward. Power	 sphere on incline, I, acceleration.	$-F = -kx^3$. Non linear spring, SHM
1985	 Projectile, cons of momentum	 spring on an incline, energy cons	 Atwoods mach, eqns of motion.
1984	 Centripetal motion, force diagram	 Orbits, mom cons, energy.	falling through a resisting medium, $F = -kmv$
1983	 proj motion in a plane	 rotation, acceleration	 skier on snowball
1982	 spring on incline, En cons	one dimensional motion of car with friction, slowing.	 torque, I, rotation equations
1981	 Incline, trans eq, friction	 Energy on a swing	 Cons of linear and ang momentum.

	M1	M2	M3
1980	 <p>spring, SHM</p>	 <p>Momentum & En Conservation</p>	 <p>Rotation w/o slipping, eqns of motion</p>
1979	 <p>Projectile, en cons, mom cons.</p>	 <p>Ferry, cons of momentum, impulse</p>	 <p>torque, ang mom, SHM w spring during rotation</p>
1978	 <p>circular, work</p>	 <p>linear and ang mom</p>	 <p>torque, ang mom, SHM w spring</p>
1977	<p>$F = -kv$, work</p>	<p>Rotation, "walk the dog" yo-yo trick</p>	 <p>Binary stars $M, 2M$</p>
1976	 <p>circ motion, friction, tangential a, kinematics</p>	 <p>rotation,</p>	 <p>energy, momentum</p>
1975	<p>falling through a resisting medium $F = -kv$ Graph drawing</p>	 <p>Cons of L</p>	 <p>Calculus, force, work done lifting chain</p>
1974	 <p>circ motion, energy, force, tangential a</p>	 <p>rotation, change μ</p>	 <p>energy, momentum, SHM</p>
1973	 <p>Two block system w/ friction</p>	<p>Work-energy theorem</p>	 <p>Angular mechanics</p>