Semester Equations in a Nutshell

When studying for a semester final, most people spend at least some time memorizing formulas. In fact, what makes finals difficult is not knowing relationships. It is being able to look at a problem with absolutely no insight as to which chapter the problem is from, identify the approach that will most probably allow you to analyze the situation, then be able to follow through with the execution of that approach. Obviously, to execute *any* of the approaches, you will need to know some equations. What you need to be aware of is the fact that KNOWING THE EQUATIONS WILL NOT GUARANTEE PASSING THE TEST. If you don't understand what the variables within a formula mean, or don't know when a formula is applicable, or don't know what the formula can do for you (and what it *can't* do), formulas will not help a bit.

Having said all of that, you will nevertheless have to review to be sure you do know the equations you are most likely going to need. To aid in this, the following is designed to allow you to determine just how much you actually know off the top of your head at this point in time.

Take a few minutes and see how many of the following relationships you can write down cold (i.e., without studying first).

-- the kinematic equations for translational motion:
-- the kinematic equations for rotational motion:
-- N.S.L. (the translational version):
-- N.S.L. (the rotational version):
-- centripetal acceleration relationship:
-- static frictional force:
-- kinetic frictional force:
-- the steps to N.S.L.
-- kinetic energy for translational motion:
-- kinetic energy for rotational motion:
-- definition of work for a constant force/angle/displacement situation:
-- definition of work for a variable force/angle/displacement situation:
-- relationship between work and a potential energy function:
-- Work/energy theorem:
-- gravitational potential energy function near the surface of the earth:
-- gravitational potential energy function far from the surface of the earth:
-- gravitational force function near the surface of the earth:
-- gravitational force function far from the surface of the earth:
-- force function for an ideal spring:
-- potential energy function for an ideal spring:
-- derivation of potential energy function from force function:

-- derivation of force function from potential energy function:
-- modified conservation of energy expression:
-- momentum expression:
-- impulse on a single body:
-- impulse equation:
-- deriving center of mass expression for a discrete distribution of mass:
-- deriving center of mass expression for a continuous distribution of mass:
-- modified conservation of momentum expression:
-- moment of inertia for a point mass:
-- integral form of the definition of moment of inertia:
-- parallel axis theorem:
-- center of mass acceleration of an angularly accelerating, rotating body:
-- center of mass velocity of a body rotating with known angular velocity:
-- *r perpendicular*--how to get it:
-- torque determine using the *r perpendicular* approach
-- torque determine using the *F perpendicular* approach
-- torque determine using the *definition* approach
-- angular momentum determine using rotational parameters:
-- angular momentum determine using translational parameters:
-- expression for the position of a vibrating object as a function of time, or x(t) :
-- characteristic equation associated with *simple harmonic motion*:
-- period as function of the frequency of a vibrating body:
-- angular frequency of a vibrating spring whose spring constant is k:
-- angular frequency of a simple pendulum whose length is L:
-- angular frequency as function of the frequency:
-- a spring system's maximum velocity (and where does it happen?):
-- a spring system's maximum acceleration (and where does it happen?):
-- a spring system's maximum energy:
-- relationship between wave velocity, frequency, and wavelength