General Physics I -- Review for Exam 3 Fall 2019

I. Laws, Principles, and Theorems

Recognize these by name, know the main ideas involved, the kind of situations where applicable, etc.

The law of conservation of energy
The work-kinetic energy theorem
Newton's law of gravity
Conservation of mechanical energy
Hooke's law

II. Other Concepts, Terms, *etc*.

Define them, know what they mean, their applications, etc. *(Sometimes we define things by use of equations, in which case you will need to know what the equations mean and how to apply them.)*

Kinetic energy
Gravitational potential energy
Elastic potential energy
Dot (scalar) products
Dissipative forces
Angular position, velocity, acceleration
Angular frequency
Physical pendulum
Simple harmonic oscillator (SHO)
Thermal energy
Elastic collisions
Spring constant
Sinusoidal motion
Gravitational constant.
Uniform and non-uniform circular motion
$J = kg\ m^2/s^2$
Work
Conservative and non-conservative forces
Power
Watt = W = J/s
Simple pendulum
System/Environment
Simple harmonic motion (SHM)
Frequency
Phase constant
Period
Amplitude
Damping
Integrals (in context of work and impulse)
Internal vs. external forces on a system

III. Other Topics for Discussion, Problem-solving, *etc*.

Similarity relations between linear and rotational motion variables and equations.
Centripetal and tangential acceleration (in context of circular motion).
Arbitrary-ness of reference point for gravitational potential energy.
Energy conservation applied to gravitational and spring systems.
How can we tell if a force is conservative?
How is work represented/interpreted graphically?
Potential energy curves (turning points, equilibrium positions)
Work done by a varying force - *e.g.*, stretching or compressing a spring.
Relation of conservative forces to potential energy.
Conservation of energy problems when frictional forces (or other non-conservative forces) are present.
Perfectly elastic vs. perfectly inelastic collisions (and what lies in between).
Rotational motion described as vectors!
The various applications of the right hand rule!
Know how to compute dot products.
Differential equation describing the motion of a SHO ($d^2x/dx^2 = -\omega^2 x$) AND its solution
(how do you verify the solution actually works in the differential equation?)
Qualitatively, what is damping in an oscillating system? What is a "driven" oscillator? Resonance?
How is g related to G?
Know how to take partial derivatives and perform uncertainty calculations with them.

⇨➜➠➠ Know the stuff on the other two review sheets!

IV. Equations

Know how to apply them to above cases! I will provide you with all necessary equations except those on the *Know Sheet.* Make sure you know the notation (symbols) and the units for the physical quantities we've discussed!