Essential Skills for Physics 1 -1st and 2nd Semester

Unit	Essential Skill	Helpful Places to Study*
1-1	Student can identify correct variables and units for velocity, time, acceleration, displacement/distance.	Notes
1-2	Student knows how to solve problems that involve constant speed and average speed. (ca. 1a)	KC6
1-3	Student can determine the instantaneous velocity of an object undergoing a constant acceleration	Kinematic Problem Solving Worksheet
1-4	Student can determine the distance traveled for an object undergoing a constant acceleration.	Kinematic Problem Solving Worksheet
1-5	Student can correctly interpret motion graphs.	KG10, KG2, KG6
2-1	Student knows the variable names, symbols, unit names, and unit symbols for net force, mass, acceleration, weight/force due to gravity and acceleration due to gravity.	Notes
2-2	Student knows that when forces are balanced, no acceleration occurs; thus an object continues to move at a constant speed or stays at rest (Newton's first law). (ca 1b)	NL1
2-3	Student knows how to apply the law F=ma to solve one-dimensional motion problems that involve constant forces (Newton's second law). (ca 1c)	NL9
2-4	Students know that when one object exerts a force on a second object, the second object always exerts a force of equal magnitude and in the opposite direction (Newton's third law). (ca 1d)	NL12
2-5	Student can construct a set of accurate free body diagrams (FBD) from a group of static objects.	Newton's 3rd Law WS
3-1	Student can identify all of the variables names, variable symbols, unit names and unit symbols for force, mass, radius, velocity, universal gravitational constant, and acceleration due to gravity.	Notes
3-2	Student knows applying a force to an object perpendicular to the direction of its motion causes the object to change direction but not speed. (ca 1f)	CG2
3-3	Student knows circular motion requires the application of a constant force directed toward the center of the circle. (ca 1g)	CG2
3-4	Student knows how to solve problems in circular motion by using the formula for centripetal acceleration in the following form: $a=v^2/r$. (ca 1l*)	CG5
3-5	Student knows the relationship between the universal law of gravitation and the effect of gravity on an object at the surface of Earth and can calculate the gravitational force between any two masses. (ca 1e, 1m)	CG6
4-1	Student can identify the correct variables and unit for mass, velocity, momentum, force, time, and impulse.	Notes
4-2	Student knows how to calculate momentum as the product mv for a system.	MC1 & MC2
4-3	Student knows that an impulse produces a change in an object's momentum and can calculate this.	MC2 & MC3 & MC4
4-4	Student knows how to solve problems involving elastic collisions by using the law of conservation of momentum.	MC9
4-5	Student knows how to solve problems involving inelastic collisions by using the law of conservation of momentum.	MC8

5-1	Student knows the units and variables for gravitational potential energy, kinetic energy, height, acceleration due to gravity, velocity, work, power, force, distance, and mass.	Notes
5-2	Student knows how to calculate kinetic energy using the formula $KE = \frac{1}{2} mv^2$	WE3, Calclating KE WS
5-3	Student knows how to calculate gravitational potential energy near Earth by using the PE = mgh.	WE3, Calclating GPE WS
5-4	Student knows how to solve for height or velocity using the principles of conservation of energy.	WE8
5-5	Student knows that work changes the energy of a system and can calculate this (Work-Energy Theorom).	WE1
6-1	Student can identify the correct variables and units for heat, mass, temperature, specific heat, internal energy, and work.	Notes
6-2	Student can explain the process of heat transfer and how that affects the temperature of two materials using words such as heat, average kinetic energy, temperature, and thermal equilibrium in their explanation.	Notes
6-3	Student knows heat flow is a form of energy transfer between systems and can quantify this using the equation $Q=mc\Delta T$.	Notes/Heat Calculations WS
6-4	Students know how to analyze thermodynamic processes to determine changes in internal energy, heat, and work by using 1st Law of Thermo: $\Delta U = \Delta Q +/- \Delta W$	Notes/1st Law WS
6-5	Students know that the work done by a heat engine that is working in a cycle is the difference between the heat flow into the engine at high temperature and the heat flow out at a lower temperature and that this is an example of the law of conservation of energy.	Notes/Engines WS
7-1	Student can identify all of the variables and their units for this unit (F_E, k, q, r)	Notes
7-2	Students can determine type of charge or amount of charge on an object based on its interactions with other objects.	SE1
7-3	Students can use Coulomb's Law to determine the electric force on an object or how it changes.	SE9
7-4	Students know charged particles are sources of electric fields and are subject to the forces of the electric fields from other charges. (ca 5e)	SE12
7-5	Students know that positive charges go from high potential to low potential whereas negative charges move from low potential to high potential when in an electric field and no work is done by an external force.	Notes/Electric Field WS
8-1	Student can identify all of the variables and their units for this unit (V, I, R, P, E, t, Q)	Notes
8-2	Students know how to solve for V, I, or R using Ohm's Law and the concept of current.	EC5, EC4
8-3	Students know any resistive element in a DC circuit dissipates energy. Students can calculate the power (rate of energy dissipation) or the energy used in any resistive circuit element by using the formula P = IV and P = E/t.	EC3, EC6
8-4	Student can draw a series circuit and use the concepts of a series circuit to fill out a VIR chart.	EC9
8-5	Student can draw a parallel circuit and use the concepts of a parallel circuit to fill out a VIR chart.	EC10

***These helpful places to study are NOT the ONLY places you can use to study/prepare for the final. All worksheets and labs/activities are great places to look as well. Or, review information on physicsclassroom.com.**