Unit Three
Main Ideas

Vector Quantities

- momentum
- work
- impulse
- power

Units

- momentum & impulse = $kgms^{-1}$
- work & energy = kgm^2s^{-2}=J
- power = kgm^2s^{-3} = Js^{-1} = W

Relationships

$$KE = \frac{1}{2}mv^2$$

$$U_g = mgh$$

$$U_s = \frac{1}{2}kx^2$$

$$W = F\cos\theta d$$

$$P = Fv = \frac{W}{t}$$

$$p = mv$$

$$J = Ft = \Delta p = m\Delta v$$

$$m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2' (elastic)$$

$$v_1 + v_1' = v_2 + v_2'$$

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v' (inelastic)$$

$$U_{g,i} + U_{s,i} + K_i = U_{g,f} + U_{s,f} + K_f$$

You should be able to:

1. calculate the work done on an object.
2. relate the work done on an object to a force versus distance graph(area under the graph).
3. use the work-energy theorem to solve problems involving force, distance, mass and velocity.
4. calculate the potential energy stored in a spring or due to gravity.
5. identify when mechanical energy (U_g and K) is conserved.
6. apply conservation of energy to solve problems involving potential energies, kinetic energy and work.

7. calculate the power required to maintain the motion of a system.
8. calculate the work done by a force supplying a defined amount of power or the power of a force that completes a defined amount of work.
9. calculate the linear momentum of objects.
10. relate impulse to the change in linear momentum of an object.
11. identify situations in which linear momentum is conserved.
12. apply conservation of linear momentum to solve problems involving particles with known masses and initial velocities.
13. analyze collisions to determine the loss of kinetic energy.