Dynamics Test: Topics to Review

- Motion Diagrams
- Force Diagrams
- Newton's First Law
  - Inertial reference frames
  - Non-Inertial reference frames
  - Consistency between force diagrams and motion diagrams (Delta-v points in the same direction as the unbalanced force)
- Newton's Second Law
  - Acceleration is directly proportional to the unbalanced force
  - Acceleration is inversely proportional to the mass of the object
  - Quantitative representation of Newton's Second Law $a = \frac{\Sigma \mathrm{F}}{m}$
  - Difference between constant velocity motion and constant accelerated motion.
- Newton's Third Law
  - Newton's Third Pairs
  - Consistency between force diagrams (arrow lengths and arrow directions)
  - Quantitative representation of Newton's Third Law $F_{A-on-B} = -F_{B-on-A}$
- Friction
  - Normal force: Force of the surface on the object of interest, which is perpendicular to the surface.
  - Static Friction
    - Can vary between zero and a maximum value
    - Resists the movement of an object along a surface if the surfaces are NOT sliding against each other.
    - Quantitative representation of maximum force of static friction on any object: $F_{SF-on-O} = \mu_s N$
  - Kinetic Friction
    - Does not vary like static friction, remains the same.
    - Resists the movement of an object along a surface if the surfaces are sliding against each other.
    - Quantitative representation of maximum force of static friction on any object: $F_{SF-on-O} = \mu_k N$
    - Is usually WEAKER in strength than Static Friction.
- Springs
  - Springs exert a force on another object based on how much they are stretched/compressed (Δx) and how stiff the spring is (spring constant, k).
  - Hooke's Law: $F_{Spring-on-O} = k\Delta x$