Chapter 4

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I. 4-1: Force
   a. Force: Any kind of push or pull on an object
   b. Force can be measured by using a scale
II. 4-2: Newton's First Law of Motion
   a. The First Law: Every object continues in its state of rest, or of uniform velocity in a straight line, as long as no net forces act on it
   b. Inertial Reference Frames
      i. Most cases we can assume that the reference frame fixed on the Earth are inertial frames
      ii. Reference frames wear Newton's first law are noninertial frames
   c. Note: Inertia is not a force.
III. 4-3: Mass
   a. Mass: The measure of the inertia of an object
   b. Kilogram is the default unit
IV. 4-4: Newton's Second Law of Motion
   a. The Second Law: The acceleration of a n object is directly proportional to the net force acting on it, and is inversely proportional to its mass. The direction of the acceleration is in the direction of the net force acting on the object
      i. $a = \frac{\Sigma F}{m}$
      ii. $\Sigma \mathrm{F} = ma$
      iii. $m = \frac{!"}{\#}$ (i.e $m = \frac{\$}{!"} \times a$)
V. 4-5: Newton's Third Law of Motion
   a. The Third Law: Whenever one object exerts a force on a second object, the second exerts an equal force in the opposite direction on the first
VI. 4-6: Weight - The force of Gravity and the Normal Force
   a. Gravitational Force: $F_{\%} = mg$
   b. Normal Force: A contact force that acts perpendicular to the common surface of contact
VII. 4-7: Solving Problems with Newton's Laws: Free-Body Diagrams
   a. See Homework
VIII. 4-8: Problems Involving Friction, Inclines
   a. Kinetic Friction: The friction when an object is "sliding" $F_{\&'} = \mu_(F_)$
   b. Static Friction: A force parallel to the two surfaces that can arise even when they are not sliding $F_{\&'} \leq \mu_* F_)$
   c. Theta is equal to the degree between $F_{\%}$ and $F_{\%+}$

Newtons Laws of Motion:

1. Every object continues in its state of rest, or of uniform velocity in a straight line, as long as no net forces act on it (i.e. Law of Inertia)
2. The acceleration of a n object is directly proportional to the net force acting on it, and is inversely proportional to its mass. The direction of the acceleration is in the direction of the net force acting on the object
   $F = ma$
3. Whenever one object exerts a force on a second object, the second exerts an equal force in the opposite direction on the first

Equations pertaining to Friction:

- $F_{\&'} = \mu_(F_)$
- $F_{\&'} \leq \mu_* F_)$
- $F_{\%_)} = mg \sin(\theta)$
- $F_{\%_\_} = mg\cos(\theta)$

Some other notes:

- The tension in a string is equal