Motion

I. Aristotle used logic to determine the nature of the natural world
   A. Objects have natural motion (falling, rising) and violent motion (caused to move)
   B. Cease moving when they reach their natural place
   C. Heavy objects fall faster than light ones
II. Galileo
   A. Used experiment to test logical ideas
   B. Defined "inertia" –object will keep moving in the same direction and speed unless acted upon by outside influences—like friction
   C. Determined falling objects fall faster if they fall longer, weight not a factor
      1. used inclined planes to test the inertia of objects
      2. found height reached corresponded to height released, not weight or steepness of either incline
III. Mass
   A. Measure of inertia, how much matter is there
   B. Mass does not change from one location to another
   C. Weight is proportional to mass,
      1. a force created by the influence of gravity on the mass
      2. measure of weight: pounds, Newtons
   D. not a measure of volume
IV. Force
   A. A vector quantity—has magnitude (size) and direction
   B. Applied forces add up (or subtract if in opposite directions)
   C. If sum of forces is zero, system is in EQUILIBRIUM
      1. Equilibrium can be static (unmoving)
      2. or dynamic (moving in the same direction at the same speed)
   D. friction is a force that acts to resist motion,
      1. always opposite direction to applied force
      2. of the same magnitude if object is not accelerating
V. Motion
   A. Three types considered here: speed, velocity and acceleration
   B. Speed: a rate
      1. $\frac{\text{distance}}{\text{time}}$
      2. common units of speed $\frac{\text{miles}}{\text{hour}}$, $\frac{\text{meters}}{\text{second}}$, $\frac{\text{kilometers}}{\text{hour}}$
      3. KEEP UNITS WITH NUMBERS IN ALL CALCULATIONS!!
      4. rate x time = distance
   C. Velocity is a vector, has magnitude of rate, and has direction
   D. Acceleration is how fast you are changing speed! If you are going the same speed, then you are not accelerating!!
      1. $\frac{\text{change in velocity}}{\text{change in time}} = \frac{\Delta v}{\Delta t}$