

Solution Newton's Laws

1. If no net force acts on an object, it will move at a constant velocity (in magnitude and direction)
 - a. If an object moves at constant velocity, it can not experience a net force.
 - b. If no net force is applied to an object, it must move at a constant velocity
2. $F = ma$
 - a. If a force is exerted on a mass m , it will accelerate in the direction of that force and proportional to the magnitude of that force. The proportionality constant is the inverse of its mass;
 - b. If an object accelerates with acceleration \vec{a} , the a (net) force must be active that is in the direction of \vec{a} and has magnitude ma
 - c. The mass of an object is a measure of its resistance to a change in velocity. A given force will provide a change in velocity per unit time according to $\frac{d\vec{v}}{dt} = \frac{\vec{F}}{m}$
 - d. $\vec{F} = \frac{d\vec{p}}{dt} = m\vec{a}$ A force changes the momentum of an object
 - e. $d\vec{p} = \vec{F}dt$. A force acting during a small amount of time, dt , on an object will change its momentum by an amount $d\vec{p}$ equal to that force times the time interval.
3. Action = -reaction
 - a. If body 1 exerts a force $\vec{F}_{1 \text{ on } 2}$ on body 2, then body 2 exerts an equal, but oppositely directed force on object 1
 - b. If body 1 exerts via another body 3 a force on body 2, then the action=-reaction pair does apply to the pair body1 and body3 as well as to body 2 and body 3 but not to body 1 and body 2.