

Chapter 14, Lesson 3

What are Newton's laws of motion?

Net Forces

- different forces can act on an object at the same time
- they may act in different directions
- some may be stronger than others
- the combination of all forces on an object is called net forces
- when equal forces act on an object in opposite directions, the forces are balanced (equilibrium)
- if forces acting in one direction are greater than the others, the forces are unbalanced
- unbalanced forces acting on an object cause it to change its motion

Newton's First Law

- says that unless a net force acts on an object, the object will remain in constant motion
- an object at rest stays at rest until a net force acts on it
- inertia: the tendency of an object to resist any change in motion

Newton's Second Law

- describes how acceleration, mass, and net forces are related
- acceleration: the rate at which the velocity of an object changes over time
- Formula that describes the relationship between force, mass, and acceleration is: Force = Mass x Acceleration ($F = M \times A$)
 - $200 \text{ N} = 100 \text{ kg} \times 2 \text{ m/s}$
- the stronger the force acting on an object, the more that object will accelerate
- force will cause an object with small mass to accelerate more than an object with large mass
- If you want to find the acceleration of an object use this formula: $A = \text{force} \div \text{mass}$
- If you want to find the mass of an object that has a force on it, use this formula: $\text{Mass} = \text{force} \div \text{acceleration}$

Newton's Third Law

- states that when one object exerts a force on a second object, the second object exerts a force on the first object

- sometimes called action-reaction forces
- action-reaction forces are always equal and opposite, and they always occur in pairs