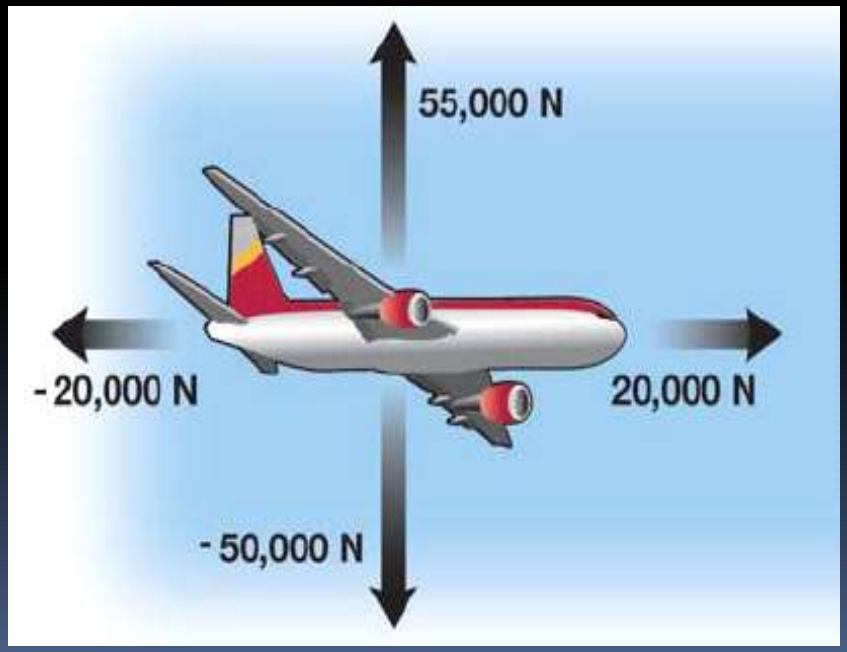
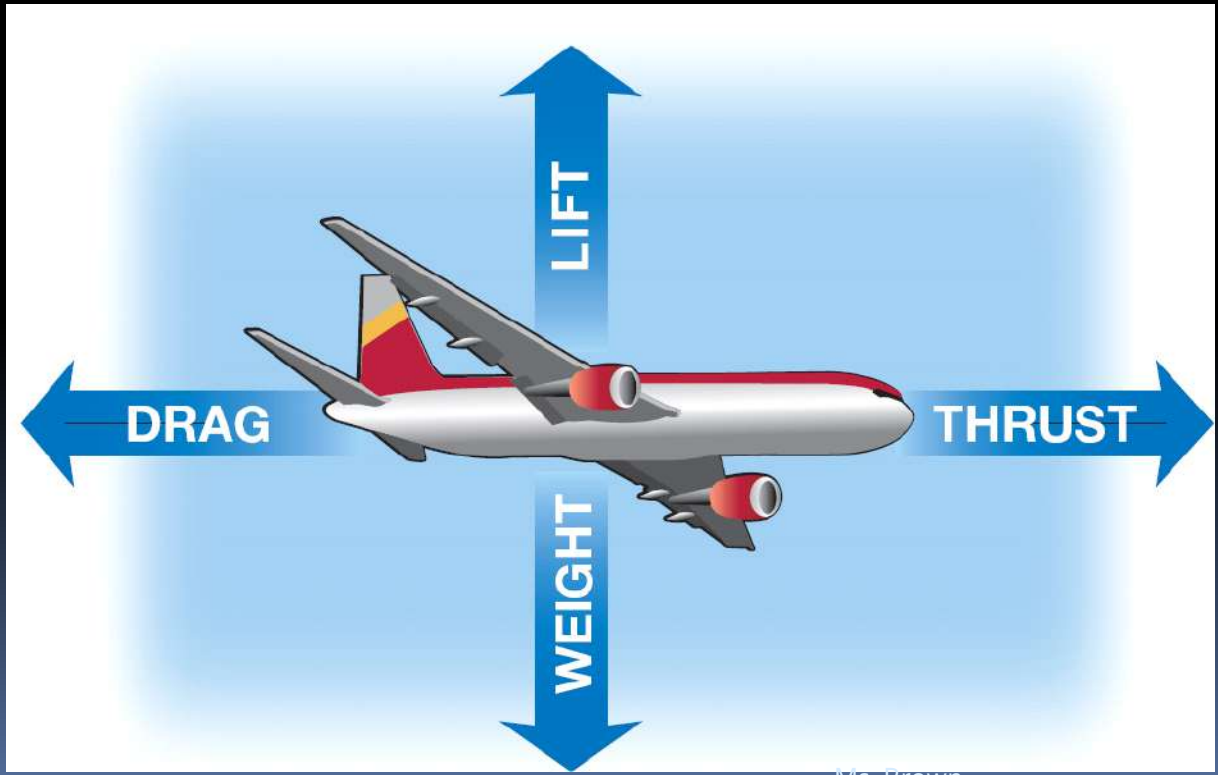
5.3 - Forces and Equilibrium ~Background info~

- The sum of all the forces acting on an object is called the **"net force" (or total force).**



5.3 - Forces and Equilibrium

- To figure out if or how an object will move, we look at ALL of the forces acting on it.

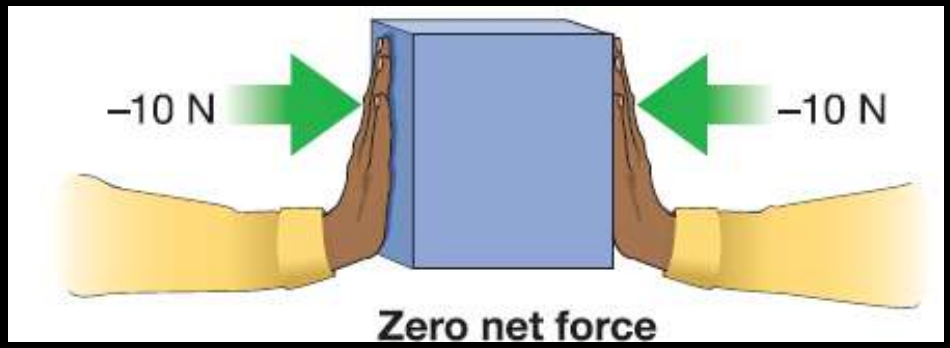


5.3 - Forces and Equilibrium

When several forces act on the same object:

1. The net force is zero

Or

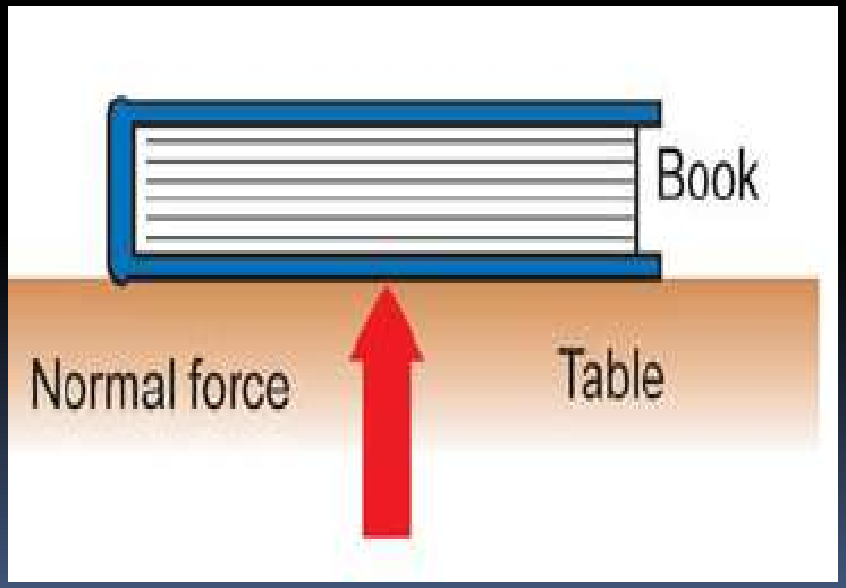


2. The net force is NOT zero.

5.3 - Forces and Equilibrium

- When the forces are ***balanced***, the net force is zero.

- When the net force on an object is zero, we say the object is in ***equilibrium***.

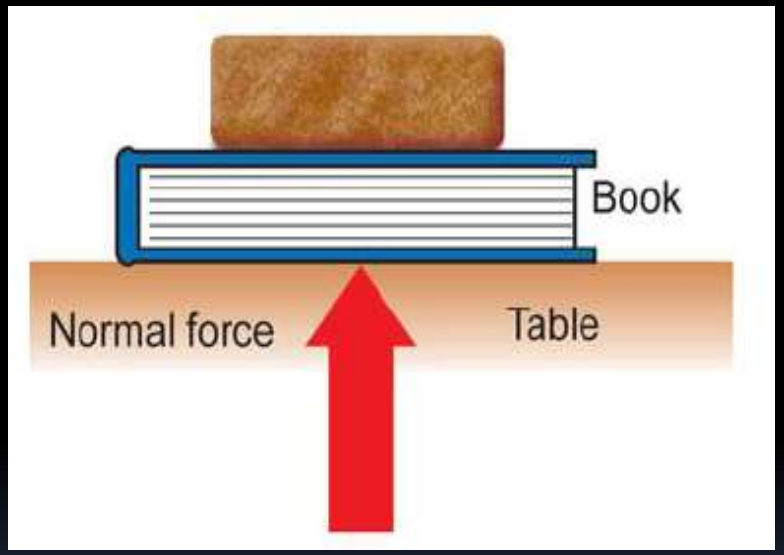


5.3 - Forces and Equilibrium

- What is a normal force?

- A ***normal force*** is created whenever an object is in contact with a surface.

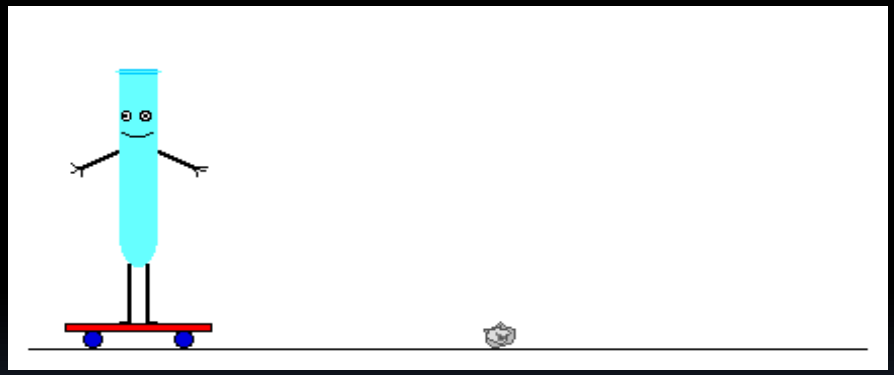
- The normal force has **equal strength** to the force pressing the object into the surface, which is often the object's weight.



Newton's 1st Law of Motion: Law of Inertia

Ms. Brown

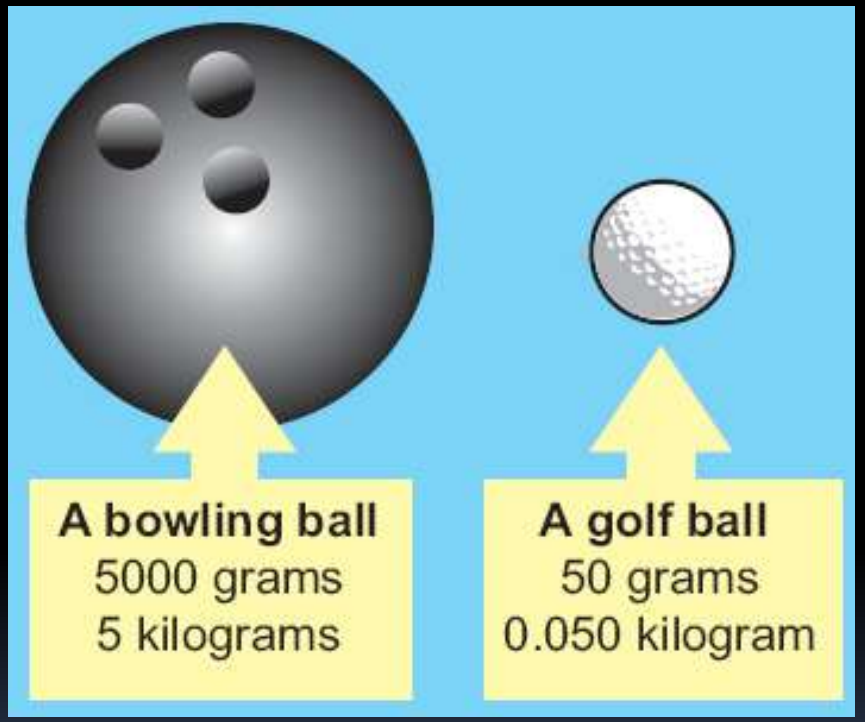
- ***Newton's first law*** says that objects continue the motion they already have unless they are acted on by a net force.



- ***"An object at rest will stay at rest and an object in motion will stay in motion UNLESS there is a net force to act on it."***

Newton's 1st Law of Motion: Law of Inertia

- ***Inertia*** is the property of an object that resists changes in motion.
- Objects with more mass have more inertia and are more resistant to changes in their motion.



Which ball has more inertia?

Newton's 2nd Law of Motion:

Force = mass x acceleration

- According to ***Newton's second law***, the amount of acceleration depends on both the force and the mass.

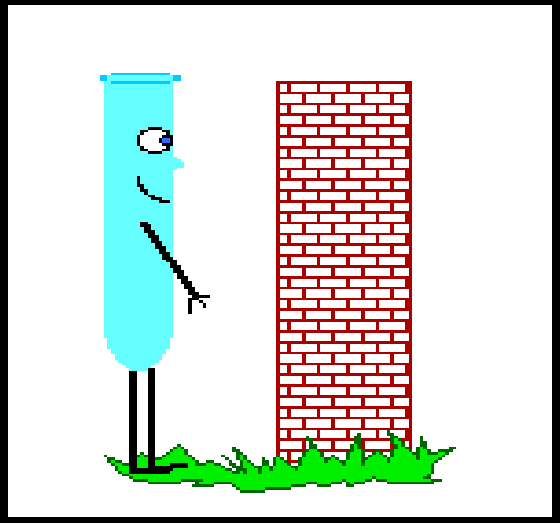
F = m x a

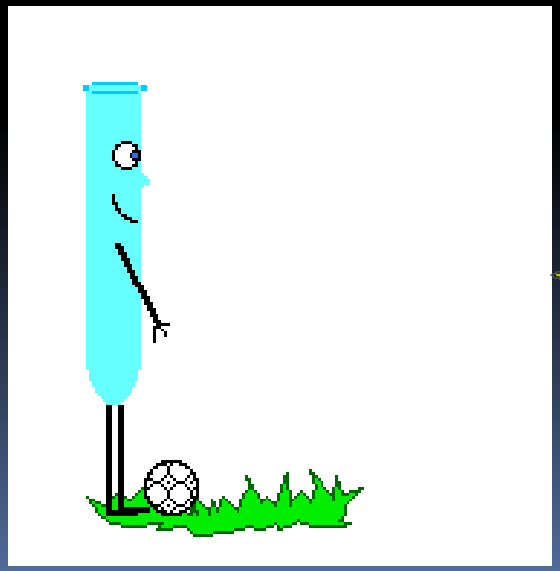
There are three main ideas related to Newton's Second Law:

1. Acceleration is the result of unbalanced forces.
2. A larger force makes a larger acceleration.
3. Acceleration is inversely proportional to mass.

Newton's 2nd Law of Motion:

Force = mass x acceleration

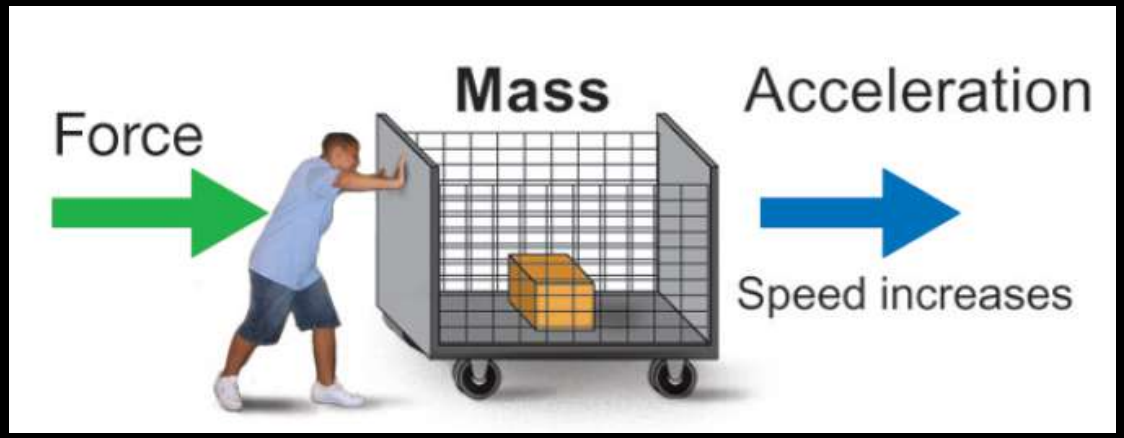




The stronger the force on an object, the greater its acceleration.

Newton's 2nd Law of Motion:

Force = mass x acceleration

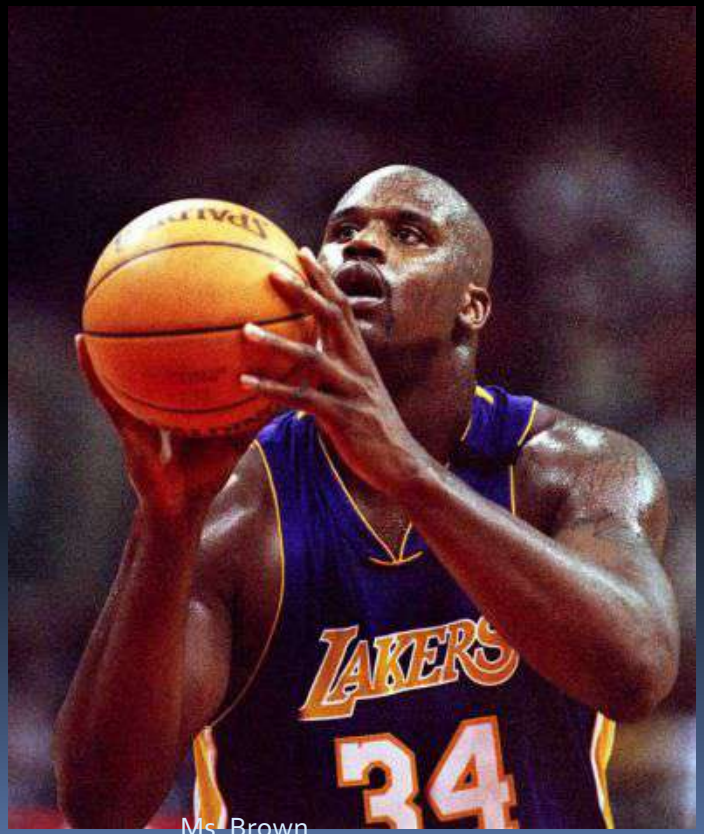


The greater the mass, the smaller the acceleration for a given force.

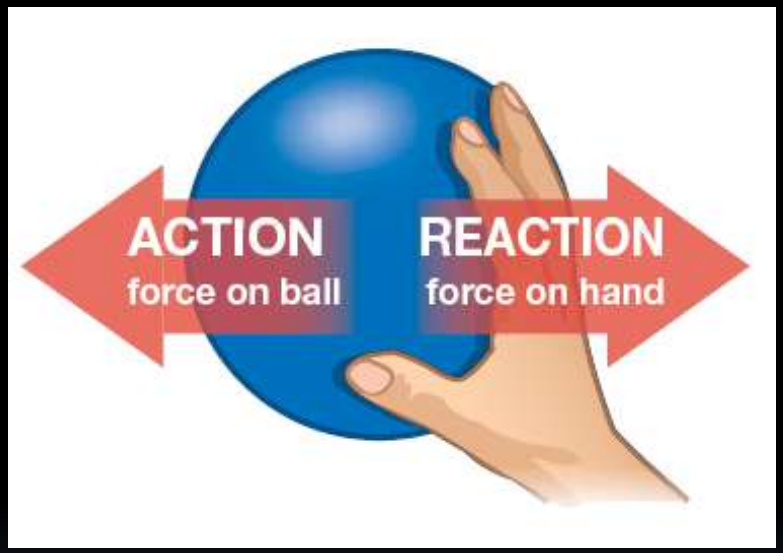
Newton's 3rd Law of Motion:

- **Newton's Third Law** (action-reaction) applies when a force is placed on any object.

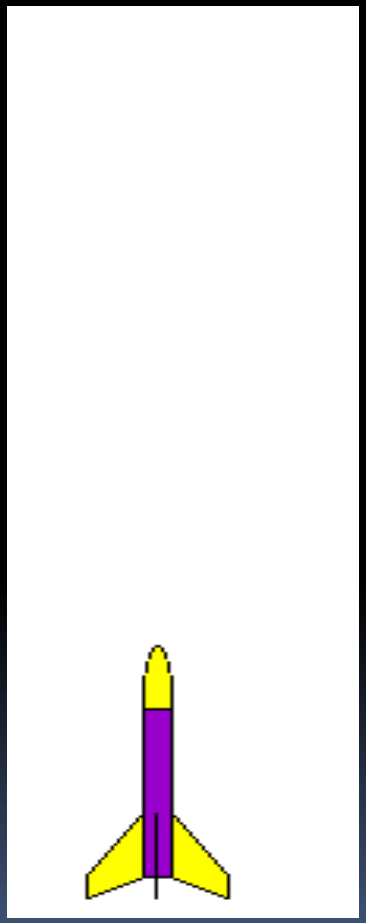
"For every action, there is an equal and opposite reaction."



Newton's 3rd Law of Motion:
action - reaction



One force acts on the ball, and the other force acts on the hand.



Newton's 3rd Law of Motion:
action - reaction

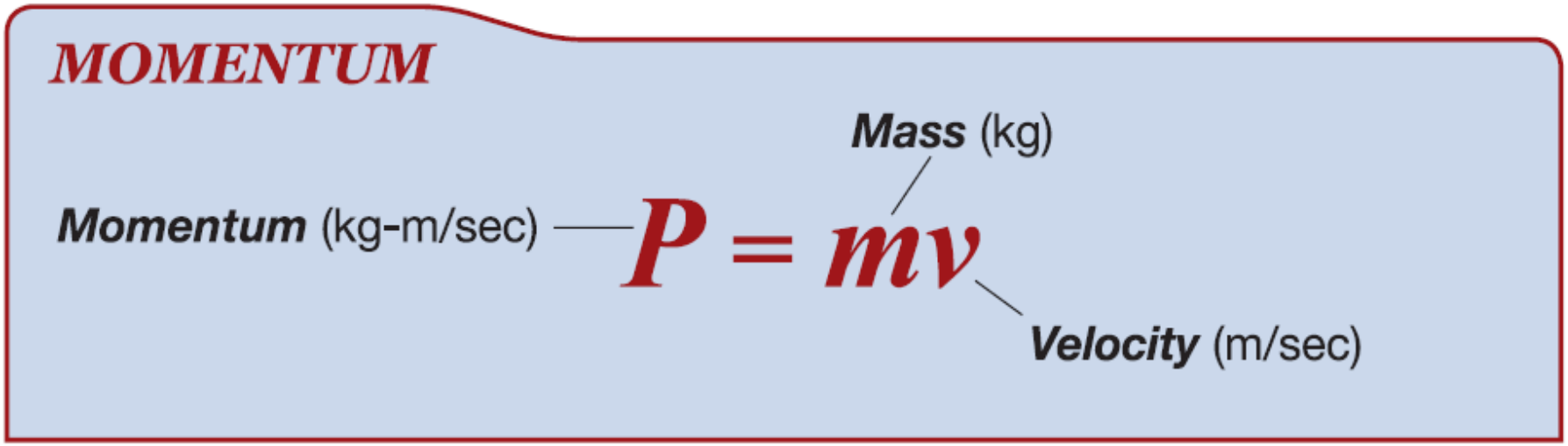
The action force is You pushing ground, and the reaction force is the Ground pushing back on you.

Newton's 3rd Law of Motion:
action - reaction

- Newton's third law tells us that any time two objects hit each other, they exert equal and opposite forces on each other.
- The effect of the force is not always the same.

Newton's 3rd Law of Motion:
action - reaction

- ***Momentum (P)*** is the mass of an object times its velocity.



Newton's 3rd Law of Motion:
action - reaction

The law of conservation of momentum

- states that as long as the interacting objects are not influenced by outside forces (like friction) the total amount of momentum is constant or does not change.

Newton's Cradle

Newton's 3 Laws Rap

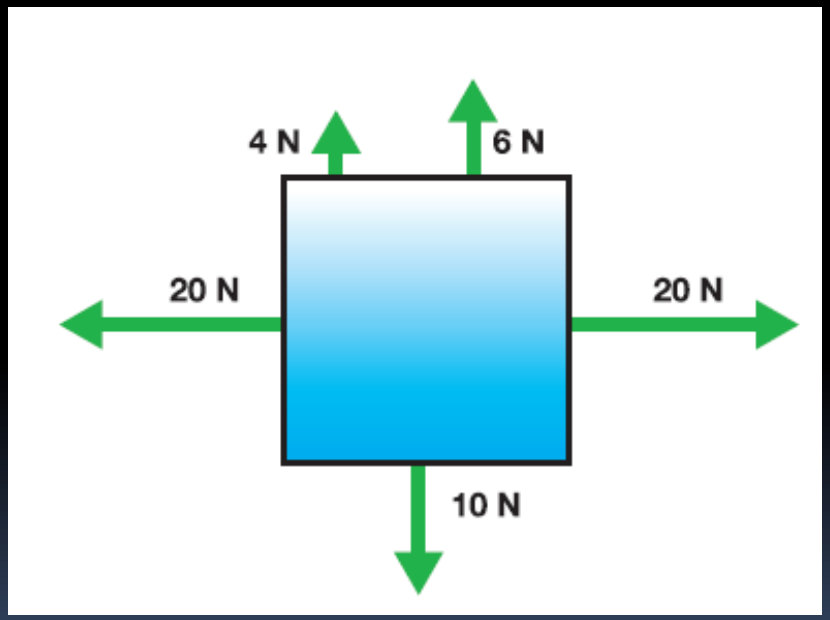
- http://www.myxer.com/video/id/1979829/ShayiLy/Laws-Of-Motion-Rap/

Question(s):

A car has a mass of 1,000 kilograms. If a net force of 2,000 N is exerted on the car, what is its acceleration?

Question(s):

Is this object in equilibrium?



Yes

Question(s):

Two chains are used to support a small boat weighing 1,500 newtons.

- One chain has a tension of 600 newtons.

- What is the force exerted by the other chain?