# Force & Motion Lecture Burst

## Inertia vs. Friction:

Newton's First Law (Inertia):

A body at rest tends to remain at rest, and a body in motion tends to remain in motion at a constant velocity, until acted upon by an unbalanced force. Simple put, things keep doing what they are doing (remaining motionless or moving straight at a steady speed) until something forces them to do otherwise.

#### Friction-

A force that opposes the relative motion of bodies that are in contact with each other. *Static Friction* is greater than *Sliding Friction*. Car example: Takes longer to skid to a stop than to roll to a stop once the brakes are applied.

#### Newton's Second Law (Motion):

*The acceleration of a body is in the direction of the net force acting on it.* Basically, an object will move in the direction and at the speed that a force is acting on it.

### Example Demonstration Activities:

1. Flying Coins



2. Coin Ring

## Newton's Third Law (Motion):

For every action there is an equal and opposite reaction force. Simply put, forces always occur in pairs. You can not touch without being touched.

## Example Demonstration Activity:

Push Me Pull You: Two students stand on skateboards, about 10 feet apart, on a smooth floor. Mark their positions on the floor. Have students hold one end of a rope that runs between them. On the signal "GO" they should both pull the rope slowly and steadily, hand over hand until they meet. Mark on the floor the place where they met. Next, have the students return to their starting points. This time have one student simply hold their end of the rope while the other student pulls the rope steadily as before. *Even though only one student is pulling on the rope, they should end up in the same location as before.* 

If there is a big difference between the weights of the two students, one student will move farther than the other!? How can this be if the action and reaction forces are supposedly equal? Keep in mind that if equal forces push a light object and heavy object, the lighter object will travel faster & farther. *This is part of <u>Newton's Second</u> Law of Motion (The acceleration of a body is inversely proportional to it's mass).* 



