Name_____

NEWTON'S THIRD LAW

Directions: Read the information below.

For every action there is an equal and opposite reaction. Children on a playground often have a bouncy ball to play with. When you slam a ball to the ground, it will bounce back up. The harder you push it toward the ground the farther it will travel back. The action is you pushing it to the ground, the reaction is the ball bouncing back up. If a cyclist rides his or her bicycle into a wall (we suggest you don't try this) they will not simply stop, rather you will notice they bounce back away from the wall first.

Newton's Third Law of Motion tells us that for a force in one direction, there will be an equal force in the other direction. Mathematically, we see it written as:

$$F_{AB}=-F_{BA}$$

This portion of the laws of motion explains how airplanes work. You probably understood already that airplanes don't just start rolling along a runway and suddenly lift. There's a reason that they don't simply fall out of the sky. This is because of actions and reactions. If you have ever sat in an airplane seat near the engines, you know how loud they can be. They provide a lot of force as they exert energy backward. The reaction of this is that the plane pushes forward. Rockets launch the same way. When you see a burst of fire (think: energy) pushing downward, the reaction is that the rocket will launch high up into space. The larger the action the greater the reaction.

It is important to note that we need to have the assistance of outside forces to make this possible. Recall that energy cannot be created, thus you cannot, for example, push your hands downward quickly and expect to float upward. In order to create a change in motion there will need to be a force other than yourself acting upon you.

Directions: Answer the questions below.

1. Describe an example in your own life when you have seen Newton's Third Law of Motion.

2. Use Newton's Third Law of Motion and information from the text to draw a picture that explains why airplanes do not fall out of the sky.

3. If two students are running down the hall toward each other, trying to get to class, and they have the same mass and acceleration, what will happen when they collide? Will their forces cancel out or will each one experience a reaction? Use words and a diagram or picture to explain your reasoning.