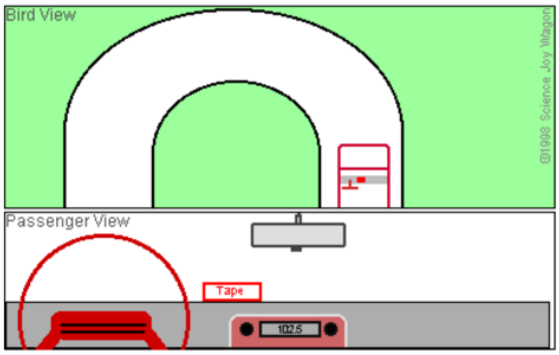
AP Physics
Instructor: Mr. Butler

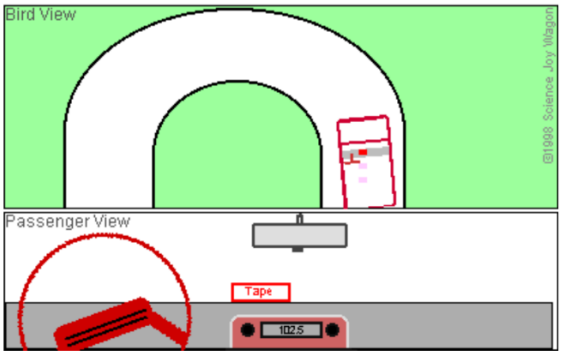
Inertial and Non-Inertial Refernce Frames

The images below show successive views of a car as it begins to curve to the left. Inside each image, the bottom view is one from the passenger seat and the top one is a "bird's eye" view from above. As the car enters the curve the passenger sees the tape cartridge on the dash begin to slide to the right and eventually fly out the window. Upon seeing this the passenger invents a force (the centrifugal force) to account for the observation of a pull on the tape and on him to the right. The bird, however, would notice something quite different. The bird would see the tape maintain its original direction of travel; in a straight line governed by its inertia and accounted for by Newton's first law. Unlike the car's tires and the road, the light weight tape and the dash develop very little friction between them so the tape continues in the same direction it was traveling before the car entered the curve. Centrifugal force is one of a number of "false" or "pseudo" forces found in nature. There "existence" depends upon one's point of reference in a non-inertial reference frame. The force you feel when rounding a curve is caused by your body's inertia trying to act exactly as the tape and the can did - - maintain its original direction of travel according to Newton's first law.

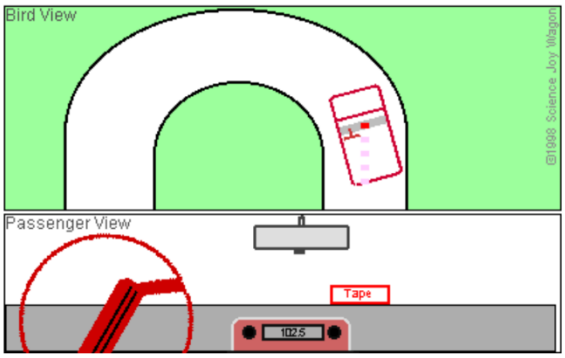
Point A



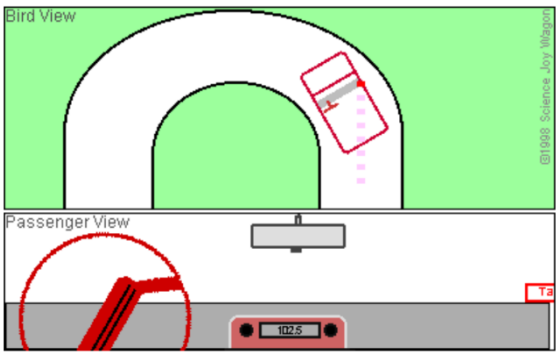
Point B



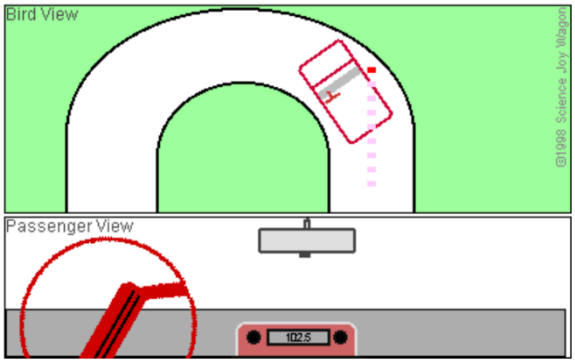
Point C



Point D



Point E



Point F