Inertia is often misinterpreted as a force

The phenomenon is correctly explained as follows: Before the car enters the ramp, the passenger is moving in a straight path. As the car enters the ramp and travels along a curved path, the passenger, because of inertia, tends to move along the original straight path. This movement is in accordance with Newton's first law, which states that the natural tendency of a body is to continue moving in a straight line.

However, if a sufficiently large centripetal force acts on the passenger, the person will move along the same curved path that the car does. The origin of the centripetal force is the force of friction between the passenger and the car seat. If this frictional force is not sufficient, the passenger slides across the seat as the car turns underneath. Eventually, the passenger encounters the door, which provides a large enough force to enable the passenger to follow the same curved path as the car does. The passenger does not slide toward the door because of some mysterious outward force. Instead, the frictional force exerted on the passenger by the seat is not great enough to keep the passenger moving in the same circle as the car.

Why it Matters

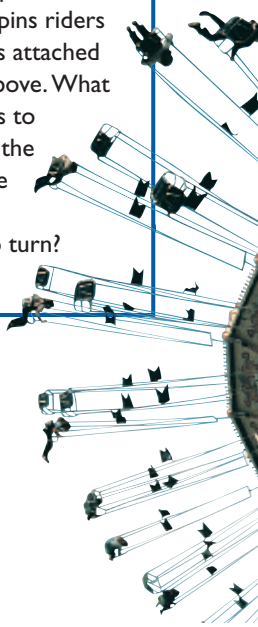
Conceptual Challenge

1. Pizza

Pizza makers traditionally form the crust by throwing the dough up in the air and spinning it. Why does this make the pizza crust bigger?

2. Swings

The amusement-park ride pictured below spins riders around on swings attached by cables from above. What causes the swings to move away from the center of the ride when the center column begins to turn?



SECTION REVIEW

1. What are three examples of circular motion?
2. A girl on a spinning amusement park ride is 12 m from the center of the ride and has a centripetal acceleration of 17 m/s^2. What is the girl's tangential speed?
3. Use an example to describe the difference between tangential and centripetal acceleration.
4. Identify the forces that contribute to the centripetal force on the object in each of the following examples:
   a. a *bicyclist* moving around a flat, circular track
   b. a *bicycle* moving around a flat, circular track
   c. a *race car* turning a corner on a steeply banked curve
5. A 90.0 kg person rides a spinning amusement park ride that has a radius of 11.5 m. If the person's tangential speed is 13.2 m/s, what is the magnitude of the centripetal force acting on the person?
6. Explain what makes a passenger in a turning car slide toward the door of the car.
7. **Critical Thinking** A roller coaster's passengers are suspended upside down as it moves at a constant speed through a vertical loop. What is the direction of the force that causes the coaster and its passengers to move in a circle? What provides this force?