Collisions for (Crash) Dummies
Worksheet

1. Would you rather be a crash dummy in an elastic collision or an inelastic collision? To answer that question, you might need a little more information. When two objects hit in an elastic collision, they bounce off of each other and do not deform. When two objects hit in an inelastic collision, on the other hand, they stick together and deform. Open your backpack and select models to create a scene that demonstrates an elastic and inelastic collision. Take a photo.

2. You might be thinking it sounds safer to be a crash dummy inside a steel ball. That is how a lot of cars were designed in the old days. They had heavy bumpers and very rigid bodies. The problem was that, inside the car, passengers were thrown around violently! Look at this car design from 1955. Using the Dissect mode, explore the car to find some of the rigid and heavy elements that drivers thought would make them safer.

3. Through crash data analysis and extensive testing, engineers discovered that it is actually better to let the car absorb the energy. If most of the energy is absorbed by the car, then the forces on the passengers inside are reduced. If all cars were made out of clay, people might be a lot safer. But that's not very practical. So engineers have done the next best thing by making them act like clay during a collision. Using the Dissect mode, explore this car to find some safer features.
4. Take a look at these crumpled cars. It took a lot of energy to smash it in that much. Look at the crash dummy. He’s not damaged. The car absorbed the energy so he did not have to thanks to a crumple zone. In your own words, how do you think crumple zones might work?

5. What if you are riding a bike or motorcycle? Crumple zones and airbags won’t help you avoid injuring your head. That’s why riders should always wear a helmet. The first bike helmets were “pith helmets” like the white ones British soldiers wore in India in the late 1800s. It took another 100 years for helmet safety standards to be adopted in the U.S. Smooth, round helmets that slide against the ground offer optimal head protection. Make some observations about the helmet.

6. Look closely at the interior of the helmet and make observations about what you see. Predict why the helmet is made of this material. Bike riders get a lot of concussions—even more than football players. That’s because a lot more people spend time on bikes than on the football field. Concussion is the most common type of traumatic brain injury. Getting a concussion can cause many physical, mental, and emotional problems. A head impact disrupts the brain for days or weeks. Professional football players and athletes in other high-impact sports are now experiencing the negative effects of having many concussions during their careers.