PLTW Launch

Activity 1 Energy

Introduction

The demonstration of the egg breaking as it collided with a wall or other solid object at the end of the ramp may have raised some questions. These questions may include:

Why did the egg break?

What does the egg demonstration have to do with energy?

What changes can I make on my vehicle to keep my egg passenger safe?

In this activity you will learn about energy, collisions, and seat belt safety as you prepare to design a vehicle restraint system in the final design problem.

Equipment

- Launch Log
- Tablet
- Tablet application
    - Canvas by Instructure

Procedure

1. Read the following article on seat belt safety. As you read, think about how you can apply what you are learning to the design problem at the end of the module.
2. Discuss the article with another student. Talk about the topics below:
    a. What fact in the article surprised you the most?
    b. How can this information help you as you think about a design to keep your egg passenger safe?
3. Follow your teacher's directions to discuss the article as a class.
4. Answer the conclusion questions in your Launch Log or in the LMS as directed by your teacher.

Conclusion Questions

1. Why is it important to know about energy and forces when designing a seatbelt?
2. When should you wear a seatbelt? Why?

Seatbelts Save Lives

Did you know according to the National Highway Traffic and Safety Administration every year in the United States more than 12,000 lives are saved by seatbelts? How does a seatbelt keep you safe in a car? Buckle up and read on to find out!

In 1930 several U.S. doctors began putting seatbelts into their cars and encouraged car manufacturers to include seatbelts in their designs. At this time the seatbelts were lap belts. Three-point safety belts, like the ones in the front seat of cars today, were invented by a Swedish design engineer named Nils Bohlin. Mr. Bohlin had worked on safety harnesses in airplanes and was hired by Volvo to create a safer seatbelt. In 1959 Volvo introduced the three-point seatbelt. In the interest of safety, Volvo made the new seatbelt design available to other car companies for free. By 1964 about half of U.S. states required seatbelts in the front seat.

Today, all 50 states require seatbelts for all passengers and have laws for child safety seats for babies and young children. Seatbelts keep passengers safe in a collision by absorbing energy and keeping the person attached firmly to the seat. Air bags also protect passengers by absorbing the energy of the moving person.

If seatbelts and air bags absorb energy, where does the energy come from? And what is energy?

Energy is the ability to do work. This work is done by applying force to an object. Force is a push or a pull that can make the object move, stop moving, or change directions. When a car suddenly stops, the people in the car are still moving and will continue to move until a force pushes or pulls on them, causing them to stop. Seatbelts and air bags safely stop the person from moving forward.

Where did the person get the energy that needs to be absorbed? And does it matter how fast a car is driving?

The person riding in the car is being pushed by the car. While you sit in a car, the car applied a force on your body to accelerate from rest to whatever speed that both you and the car are moving. The faster the car is moving, the more energy will need to be absorbed in a collision to keep the passengers safe.