Scenario

Probably the most dangerous thing you will do today is travel to your destination. Transportation is necessary, but the need to get there in a hurry, and the large number of people and vehicles, have made transportation very risky. There is a greater chance of being killed or injured traveling than in any other common activity. Realizing this, people and governments have begun to take action to alter the statistics. New safety systems have been designed and put into use in automobiles and airplanes. New laws and a new awareness are working together with these systems to reduce the danger in traveling.

What are these new safety systems? You are probably familiar with many of them. In this chapter, you will become more familiar with most of these designs. Could you design or even build a better safety device for a car or a plane? Many students around the country have been doing just that, and with great success!

Challenge

Your design team will develop a safety system for protecting automobile, airplane, bicycle, motorcycle, or train passengers. As you study existing safety systems, you and your design team should be listing ideas for improving an existing system or designing a new system for preventing accidents. You may also consider a system that will minimize the harm caused by accidents.
Your final product will be a working model or prototype of a safety system. On the day that you bring the final product to class, the teams will display them around the room while class members informally view them and discuss them with members of the design team. During this time, class members will ask questions about each others products. The questions will be placed in envelopes provided to each team by the teacher. The teacher will use some of these questions during the oral presentations on the next day.

The product will be judged according to the following three parts:

1. The quality of your safety feature enhancement and the working model or prototype.

2. The quality of a five-minute oral report that should include:
   - the need for the system
   - the method used to develop the working model
   - the demonstration of the working model
   - the discussion of the physics concepts involved
   - the description of the next-generation version of the system
   - the answers to questions posed by the class

3. The quality of a written and/or multimedia report including:
   - the information from the oral report
   - the documentation of the sources of expert information
   - the discussion of consumer acceptance and market potential
   - the discussion of the physics concepts applied in the design of the safety system

**Criteria**

You and your classmates will work with your teacher to define the criteria for determining grades. You will also be asked to evaluate your own work. Discuss as a class the performance task and the points that should be allocated for each part. A starting point for your discussions may be:

- Part 1 = 40 points
- Part 2 = 30 points
- Part 3 = 30 points

Since group work is made up of individual work, your teacher will assign some points to each individual’s contribution to the project. If individual points total 30 points, then parts 1, 2 and 3 must be changed so that the total remains at 100.