Chapter 10 Project: Full Stop Ahead

Beginning the Chapter Project

What is a safe distance between cars traveling on the highway? After you apply brakes to stop your car, how far will your car travel before coming to a full stop? How do accident investigators determine whether cars involved in accidents were traveling at safe speeds? There are many variables that affect how quickly a car can stop. These variables include the car’s speed, the driver’s reaction time, the type of road, the weather conditions and, of course, the effectiveness of the brakes.

As you work through the activities, you will use formulas to estimate safe speeds under various conditions. You will make a graph to illustrate the relationship between speed and stopping distance. Then, you will plan a skit with your classmates to illustrate what you have learned about safe highway driving.

List of Materials

- Calculator
- Graph paper

Activities

Activity 1: Graphing

To reduce the likelihood of an accident when driving, you should consider how far your car will travel before safely coming to a stop for the speed at which you are traveling. Assume you are traveling on a dry road and have an average reaction time. The formula $d = 0.044s^2 + 1.1s$ gives you a safe stopping distance $d$ in feet, where $s$ is your speed in mi/h. Make a table of values for speeds of 10, 20, 30, 40, 50, and 60 mi/h. Then, graph the function.

Activity 2: Calculating

Suppose a car left a skid mark $d$ feet long. The formulas shown will estimate the speed $s$ in miles per hour at which the car was traveling when the brakes were applied.

- Use the formulas to complete the table of estimated speeds. Round speeds to the nearest mile per hour.

<table>
<thead>
<tr>
<th>Skid Mark Length (d)</th>
<th>Estimated Speed (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 ft</td>
<td>Dry Road</td>
</tr>
<tr>
<td>120 ft</td>
<td>Wet Road</td>
</tr>
</tbody>
</table>

- Why do you think the estimates of speed do not double when the skid marks double in length? Based on these results, what conclusions can you make about safe distances between cars?
Activity 3: Reasoning
Suppose you are driving on a dry road with 150 ft (about 10 car lengths) between your car and the car in front of you. Use the formula from Activity 1 to find the maximum speed you should be traveling in order to leave a safe stopping distance.

Activity 4: Communicating
Work with a group of your classmates to plan a skit that will demonstrate what you have learned about safe distances in driving. Illustrate the relationships among reaction times, road conditions, speeds, and stopping distances.

Finishing the Project

The answer to the four activities should help you complete your project. Gather together all the data you compiled as you worked on the project. Include the equations you used and your graphs. Discuss your conclusions about safe driving speeds, stopping distances, and road conditions with your classmates. Then, as a group, plan and rehearse your skit.

Reflect and Revise
Present your skit to a small group of classmates. After you have heard their comments, decide if your presentation is clear and convincing. If needed, make changes to improve your skit before presenting it to the rest of the class.

Extending the Project
If you have access to Internet, explore some of the forums and user groups that are related to driving and motor vehicles.

You may also want to contact a highway patrol officer or a registry of motor vehicle official for more information about the habits of drivers. Ask them what errors or violations are most common.