

Key Physics Concepts	
Section Summaries	Physics Principles
<p>Section 1 Reaction Time: Responding to Road Hazards</p> <p>Using various reaction timers, students explore the time it takes them to react to a situation. This section introduces students to the process of first beginning with their own ideas and predictions, then implementing an investigation that results in both qualitative and quantitative data.</p>	Reaction time
<p>Section 2 Measurement: Errors, Accuracy, and Precision</p> <p>Students count the number of strides it takes them to cover a selected distance in an area away from traffic. Students measure the length of their stride using a meter stick and calculate the entire distance by multiplying the total number of strides with the length of each stride. The measurements are then compared by each group. By comparing measurements, students arrive at an understanding of error and the different kinds of errors present in a measurement.</p>	Errors in measurement Accuracy Precision
<p>Section 3 Average Speed: Following Distance and Models of Motion</p> <p>Strobe or multiple-exposure photos of a moving vehicle are used to illustrate speed and acceleration. Students then use a motion detector to measure their walking speed and obtain a computer-generated graph of their motion. Information about speed and velocity is then connected to reaction distance with a discussion on tailgating.</p>	Average speed Instantaneous speed Velocity Reaction distance
<p>Section 4 Graphing Motion: Distance, Velocity, and Acceleration</p> <p>Students use sloped tracks to investigate the speed and distance an automobile travels before stopping. They then examine data on time and distance required to stop a vehicle moving at various speeds. This is connected to the total time required to react to a hazard, apply force to the brake, and slow the motion of the vehicle to a complete stop.</p>	Acceleration Positive acceleration Negative acceleration Vector quantity
<p>Section 5 Negative Acceleration: Braking Your Automobile</p> <p>The students investigate the relationship between an automobile's speed and the distance required to bring it to a stop. Students draw graphs to study the change in velocity with respect to time. The concept of negative acceleration is explored in this context.</p>	Negative acceleration Braking distance
<p>Section 6 Using Models: Intersections with a Yellow Light</p> <p>Using a spreadsheet model of an intersection, students explore how reaction time, speed, and stopping distance affect what they should do at a yellow light. This also introduces them to how transportation engineers use a computer simulation to model various factors affecting decisions about speed limits and traffic-light cycles. Students now have the opportunity to apply their understanding of reaction time, distance vs. velocity, and braking distance to identify the STOP, GO, and Dilemma Zones at intersections when they see a yellow light.</p>	Speed Negative acceleration Distance vs. time relationships
<p>Section 7 Centripetal Force: Driving on Curves</p> <p>Students' perceptions and prior learning about the force needed to change the direction of a moving object are challenged in this section. After performing investigations, they reflect on the discrepancy between their perceptions and observed results. Students then read for more information on how forces change the direction.</p>	Force Centripetal force Centripetal acceleration