THE CHALLENGE
Determine and measure for yourself the distance it takes to get a car to come to a complete stop based on various conditions.

GRADE LEVEL
Middle school

ACTIVITY DURATION
About 30 minutes, depending on how many students want to “drive.”

MATERIALS
Measuring wheel
Chart of stopping sight distances (on page 2)

SET UP
This activity requires a large empty space such as an empty parking lot or a field.

ACTIVITY
Choose one student to be the “driver” of the measuring wheel. The other students should, in a straight line out from the driver, stand at various distances away from the driver’s starting point, anywhere from 0 to several hundred feet.

The driver chooses two conditions - travel speed and grade of the road - and from these determines the corresponding stopping sight distance using the chart or the equation on page 2. Starting with the measuring wheel at zero, the student begins to “drive” the measuring wheel along the line of students until reaching that distance. All of the students who are passed are students who may have been struck while the vehicle was coming to a stop. Students may feel like they are far away from the driver and will be “safe,” only to find out that the driver can’t stop soon enough to avoid them.

STOPPING SIGHT DISTANCE IS THE LENGTH IT TAKES FOR A DRIVER TO BRING THE VEHICLE TO A STOP AFTER SOMETHING ON THE ROAD BECOMES VISIBLE.

FOR DISCUSSION
Talk to students about the two parts of the stopping sight distance equation: perception/reaction distance—the distance the car travels just during the time the brain is making the decision and moving the foot to stop the car, and braking distance—the distance it takes the brakes to stop the car.

Discuss with students other factors that would affect the stopping distance, including weather, age, driver fatigue, alcohol/drug-impairment, vehicle size, and condition of tires and brakes.

Young drivers may not even be aware that their vehicle can travel hundreds of feet before their brain even makes the decision and moves the foot to step on the brake.
### Stopping Sight Distance Equation

\[ SSD = vt + \left( \frac{v^2}{2g[a/g + G]} \right) \]

Where  
- \( SSD \) = stopping sight distance  
- \( v \) = velocity when brakes are applied  
- \( t \) = time to perceive the need to stop  
- \( a \) = deceleration of the car  
- \( g \) = acceleration of gravity  
- \( G \) = grade of the road

If using Imperial units:
\[ SSD = 3.68v + \left( \frac{v^2}{30[0.35 + G]} \right) \]

Where  
- \( SSD \) = stopping sight distance in feet  
- \( v \) = velocity when brakes are applied, in miles per hour  
- \( G \) = grade of the road (for example, for 3% uphill add 0.03 to 0.35)

### Speed (mph) vs. Stopping Sight Distance (feet)

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Stopping Sight Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Downhill</td>
</tr>
<tr>
<td>-6%</td>
<td>-3%</td>
</tr>
<tr>
<td>25</td>
<td>165</td>
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<td>215</td>
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<td>75</td>
<td>927</td>
</tr>
</tbody>
</table>

Can I stop in time?