



## Why Do We Hear that "Speed Kills?"



### Stopping Distance

Total Stopping Distance depends upon speed, road surface, conditions, and other factors. But speed is the main ingredient. Of course, when you need stop in a hurry, things get very complicated.

- **Perception Time:** First, once must see and understand the problem, which is referred to as perception time. At highway speeds, this might take 100 feet or more.
- **Reaction Distance:** Then there's reaction distance, the distance you will travel during the time it takes you to react to a perceived problem and move your foot from the accelerator to the brake.
- **Brake Lag** is the time/distance you travel until the brakes actually contact and begin to slow you down.
- **Braking Distance:** And last there is the actual braking distance, which depends upon mechanical and surface conditions, and of course, primarily speed. This is the additional distance you travel, after perception time, reaction time and brake lag; just the time it takes your brakes to stop the vehicle.

For large, heavy vehicles, the total stopping distance can easily be in excess of 400 feet. If driving at night, it is relatively easy to "over-drive" your headlights. In other words, you might not be able to see a problem in time to stop. Your only counter-measure is to slow down. In fact, if you are going too fast for any condition, you might not be able to stop in time to avoid a crash. Conditions include weather, road, traffic, driver and vehicle.

1-G is equal to a person's or object's weight. *Kinetic energy* is the energy an object possesses when it's moving. For example, a 2000-pound car going 65 mph has slightly more than 283,000 ft-lbs of energy (For a truck, it can translate into millions of ft-lbs of energy). During a normal, non-collision stop, most of the energy is absorbed in the braking system. But in a vehicle crash, that energy is suddenly, cataclysmically dissipated—typically in less than 100 milliseconds—not by heating the brakes, but by crushing, tearing and twisting the vehicle and, in the process, exerting tremendous forces on the vehicle's occupants.

As speed increases, kinetic energy also increase, however, because the equation has a velocity-squared term in it the *increase in kinetic energy is exponential* compared to the increase in speed. That means when the *velocity or speed doubles, the kinetic energy quadruples*. Therefore, even a small velocity increase results in a disproportionate increase in kinetic energy. For example, a *5 mph* speed increase from *30 mph* to *35 mph* increases the kinetic energy by *one-third*.

It's surprisingly easy to generate 30 G's. For example, a vehicle coming to a stop in 4 feet from 60 mph would generate a millisecond (1/1000th of a second). At about 5 G's the human heart cannot force blood to the brain, resulting in a blurred vision and a host of physical problems. The blink of an eye is about 340 milliseconds. A vehicle crashing into an immovable object might take only about 80 milliseconds. This is the time it takes for the vehicle to crush, which also absorbs some of the energy. *Point: A small increase in speed could change a crash from survival to fatal.*



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