

## More Accelerated Motion Problems

1) In automobile design, the front of the car is designed to collapse in a collision, so that the passenger compartment will take longer to slow down. If a car is traveling at 30 m/s and hits a bridge abutment and stops in 1 meter, find the acceleration.

Older model cars didn't crumple as much. If they stop in 0.5 meter, find acceleration.

If you aren't belted in, you hit the dashboard at your original speed. Now your body is now doing the crumpling, stopping in 5 cm (.05 meter). What is your acceleration without seatbelts?

2) How many g's of acceleration did the passenger experience in each of the accelerations in problem one? To determine this simply divide acceleration by  $9.8 \text{ m/s}^2$ . This tells you how many times the force of gravity was experienced.

3) The current (2009) world record, held by Larry Dixon, for a piston powered dragster is 321.58 mph (143.8 m/s), it only took 5.595 s to achieve this speed. Assuming Dixon accelerated at a constant rate the entire time, find his acceleration.

- 4) If I'm driving at a speed of 10 m/s and then I take 5 seconds to accelerate to 20 m/s, how far did I travel while accelerating?
- 5) How far does a plane fly while its velocity changes from 145 m/s to 75 m/s with an acceleration of  $-10 \text{ m/s}^2$ ?
- 6) You are cruising down the highway at a high rate of speed (42 m/s) when you pass a police car parked in the bushes. The police car turns on the lights, chases you down with a constant acceleration of  $10 \text{ m/s}^2$ , and gives you a ticket (your fourth one this week!). You have your radio turned up and don't notice until the officer catches up with you. Sketch the velocity vs time for both cars on the same graph. When and where does the officer catch you?