The Plan

- Today - Driving You Crazy pt. 2
- Wednesday - Falling For Physics
- Thursday - Review
- Friday - Test

Homework

The Unexpected:

1. A car is travelling 54 km/h [W] and accelerates until the car is travelling 18 km/h [E].

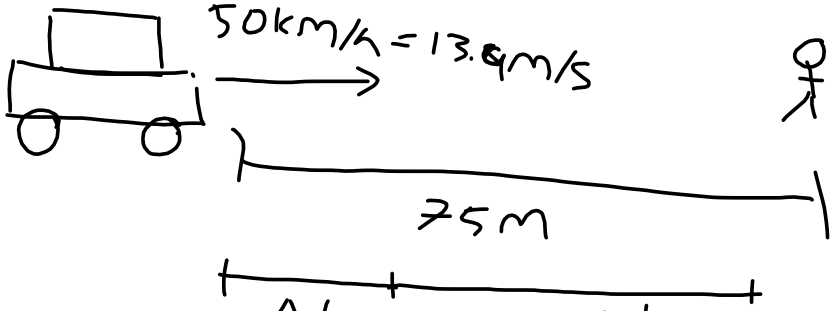
a. What is the car's acceleration if it took the car 10 s to change its velocity?

b. How far did the car travel in this time?

Reaction Time

The time it takes for you to respond to a changing situation. If you are not expecting a change this is about 0.7 seconds.

You are driving at 50 km/h and a pedestrian begins walking across a cross walk 75 m ahead. It takes you 0.7 s to react and you apply the brakes slowing you down at a rate of 6 m/s^2. Will you strike the pedestrian?



$\Delta d_r = (13.9\,m/s)(0.7\,s)$

$= 9.73\,m$

$v_f^2 = v_i^2 + 2a\Delta d_s$

$\frac{-v_i^2}{2a} = \Delta d_s$

$\frac{-(13.9\,m/s)^2}{2(6\,m/s^2)} = \Delta d_s$

$16.1\,m = \Delta d_s$

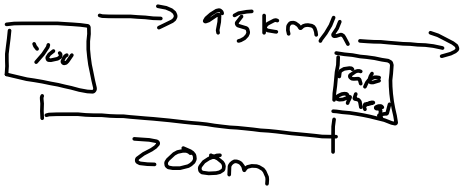
$\Delta d_{TOT} = \Delta d_r + \Delta d_s$

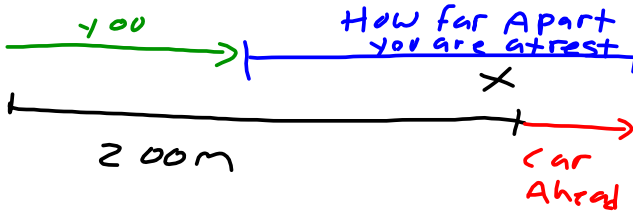
$= 9.73\,m + 16\,m$

$= 25.83\,m$

$\Delta d_{TOT} < 75\,m$

You are on the highway following 200 m behind another car. The car ahead slams on the brakes, accelerating at 8 m/s^2. While this occurs you are looking down at your speedometer for 0.5 s and notice you are travelling 95 km/h. It takes you another 0.7 s to react as well. If you can only slow down at a rate of 6 m/s^2, how close will you be to the car ahead when you come to rest?





$\Delta d_r = v \Delta t_r$

$= (26.4 m/s)(1.2 s)$

$= 31.7 m$

$\Delta d_s = \frac{-v_i^2}{2a}$

$= \frac{-(26.4 m/s)^2}{2(-6 m/s^2)}$

$= 58.1 M$

You

$\Delta d_{TOT} = \Delta d_r + \Delta d_s$

$= 89.8 m$

Car Ahead

$\Delta d_s = \frac{-v_i^2}{2a}$

$= \frac{-(26.4 m/s)^2}{2(-8 m/s^2)}$

$= 43.5 m$

$\Delta d_{you} + x = \Delta d_{CA} + 200m$

$x = \Delta d_{CA} + 200m - \Delta d_{you}$

$= 43.5m + 200m - 89.8m$

$= 153.7m$

Travelling at 100 km/h how far do you travel in meters in 1 second?

100 km/h → 27.8 m/s

Most cars cannot exceed a braking acceleration of 8 m/s^2. If you are travelling 80 km/h and see a moose 200 m away, will you stop in time (considering a reaction time of 0.7s)?