06-03

Impulse & Momentum

Stopping Distance And Graphing

Impulse/Momentum – Stopping Distance

- Remember:
  - $I = \Delta p = m\Delta v = F\Delta t$
  - Stopping gets rid of KE by doing work ($W = F\ d$)
  - Previous energy methods must all work together!
- Example: The best-selling car in America in 2012 is the Camry, with a mass of 1400 kg. Momentum is the "vector product of mass and velocity". According to Car & Driver, it takes 3.5 sec to stop from a starting speed of 31 m/s.
  - What is the braking force? (12,400 N)
  - What was the average speed of the car while braking? (15.5 m/s)
  - How far did the car go while braking? (54 m)
  - Using the work equation, how much work was done? (670,000 J)
  - Is the KE lost, the same as the work done? (Yes)

Graphing Examples

- Remember: $p = mv$, $I = \Delta p = m\Delta v = F\Delta t$
- What would be the slope of a plot of impulse vs. time?
- What would the area under the curve of a plot of F vs. time be?
- If the slope of a plot is mass and the X-axis is velocity, what is the Y axis? (hint: think of $Y = mx$, where m is mass and X is velocity, what units does Y have to be!)

(answers on next slide!)

Graphing Examples (answers)

- Remember: $p = mv$, $I = \Delta p = m\Delta v = F\Delta t$
- What would be the slope of a plot of impulse vs. time? (Force)
- What would the area under the curve of a plot of F vs. time be? (Impulse)
- If the slope of a plot is mass and the X-axis is velocity, what is the Y axis? (hint: think of Y = mx, where m is mass and X is velocity, what units does Y have to be!)

(p, momentum)