

Car Crashes

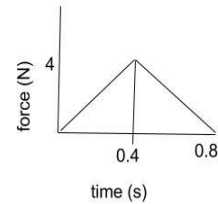
Minds On!

1) Let's start by doing some group problems.

You will be provided with 1 or more ranking problems to do together.

2) What is the impulse in each case when

- A 25 N [E] force pushes on a dynamic cart for 3.2 s?
- A hockey sticks exerts a 120 N force during 0.05 s of contact?
- The earth pulls a 12 kg rock down for 3.0 s?
- A billard ball bounces off a cushion as the graph to the side shows.



Car Crash Safety

Cars are designed today to protect passengers if they are involved in a vehicle collision.

They do this generally in 2 ways:

- Build a strong **cage** → this describes the 'box' the passengers sit in. Although the front (engine etc.) and the back (trunk etc) may collapse, the cage should maintain it's shape protected passengers from being crushed.
- Add devices that **increase the time** it takes for the car and the passengers to come to a full stop. Increased time will decrease the force required because of course, the change in momentum is a constant value.
- Add **restraints** to keep the passengers inside the car. Prior to seatbelts, passengers often flew through the windshields which incurred even more injury or death.

Here is a video that shows the advances we've made in over 50 years of designing safe cars:

<https://www.youtube.com/watch?v=ioMK1WZjP7g>



Physics of Car Crashes

You're better off in a larger, heavier car if you're going to crash.

Watch this: <https://www.youtube.com/watch?v=ExQUGk12S8U>

Optional Viewing

More Detailed: Physics of Car Crashes

The Insurance Institute of for Highway Safety (USA) has put out a very good 30 min. Video explaining the physics of collisions.

<https://www.youtube.com/watch?v=vjQA3NrVvrk>

Biology of Car Crash Injuries

If you are interested, or have time, you may wish to view this half hour video:

<https://www.youtube.com/watch?v=hi2FEyV2Z2E>



Generally, a car crashes involves 3 collisions:

1. Car collides with another object (car, wall, tree)
2. Person collides with the inside of the car (steering wheel, dashboard, airbag, seatbelt)
3. Organs/vessels with the inside of the body!