

This film shows a Dodge Grand Caravan crash into a concrete wall at 35 mph (16 m/s). By analyzing the change in momentum of the dummies inside the van, one can calculate the force exerted on them.

First, the parameters of the problem are:

- All three dummies experience a decrease in speed from 16 to 0 m/s.
- Assume the mass of the child dummy (in the backseat) is about 20 kg, typical for a 5-year old.
- Assume the child comes to rest in a time of  $\Delta t = 0.1$  s.

Now, the change in momentum, or impulse, for the child is:

$$\Delta p = I = mv_f - mv_i = 320 \text{ kg}\frac{\text{m}}{\text{s}}$$

Now, we can calculate the average force on the child:

$$F_{avg} = \frac{I}{\Delta t} = 3200 \text{ N}$$

which is equivalent to about 700 pounds of force.