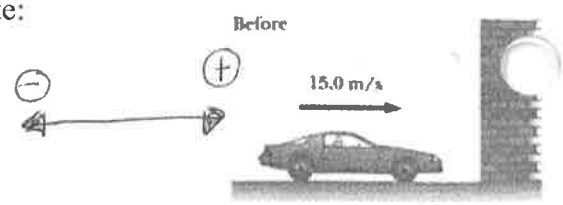
5. A 1500. kg car is in contact with a wall for 0.15 seconds. Calculate:

a) its change in momentum b) the impact force

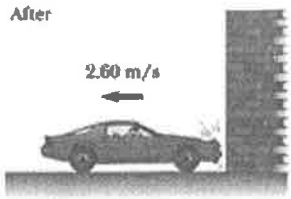


$\Delta\vec{p} = m(\vec{V}_f - \vec{V}_i)$

$= 1500.\text{kg}(-2.60\frac{m}{s} - 15.0\frac{m}{s})$

$= -2.64 \times 10^4 \text{Kg}\frac{m}{s}$

$\boxed{-2.6\times10^4 \text{Kg}\frac{m}{s}}$



$\vec{F} = \frac{\Delta\vec{p}}{t}$

$\frac{-2.64\times10^4 \text{Kg}\frac{m}{s}}{0.15\text{s}}$

$= \boxed{-1.8\times10^5 \text{N}}$

$-1.76\times10^5 \text{N}$

6. Why do coaches always tell you to "follow through" on the ball?

extending the contact time

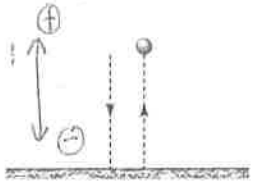
$\vec{F}\cdot t = \Delta\vec{p}$ therefore increasing

$= m\Delta\vec{v}$ velocity

7. Which cannon will shoot the cannonball further? Why?

Longer contact time will result in a greater impulse and a greater change in velocity.

8. Compare the impulse when a 1.0 kg ball bounces off the floor to when it doesn't.



$\vec{V}_i = -5\frac{m}{s}$ $\vec{V}_f = 5\frac{m}{s}$

$\Delta\vec{p} = (V_f - V_i)m$

$\Delta\vec{p} = (5\frac{m}{s} - -5\frac{m}{s})(1.0\text{Kg})$

$\Delta\vec{p} = 10\text{Kg}\frac{m}{s}$

more impulse

greater change in momentum

$\vec{V}_i = -5\frac{m}{s}$ $V_f = 0\frac{m}{s}$

$\Delta\vec{p} = (0\frac{m}{s} - -5\frac{m}{s})(1.0\text{Kg})$

$\Delta\vec{p} = 5.0\text{Kg}\frac{m}{s}$

In general,

Rebounding produces a greater change in momentum + impulse than crashing + stopping.