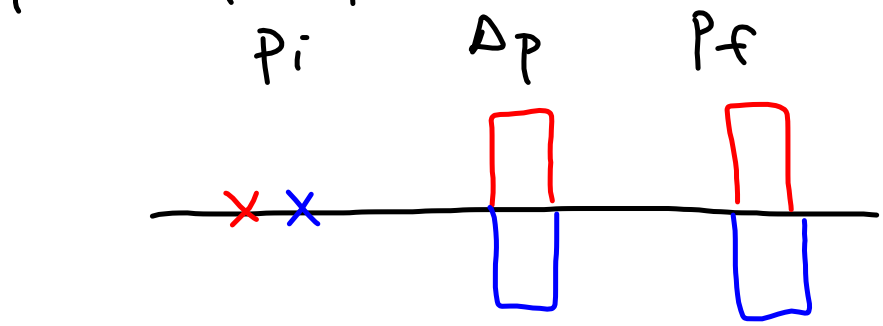
$p_i - \Delta p - p_f$



A bouncy ball (0.50 kg) is dropped and strikes the ground with a velocity of 12 m/s. The floor applies a force of 400 N over a time period of .02 s. Find the impulse on the ball (magnitude and direction) and final velocity of the ball as it leaves the floor.

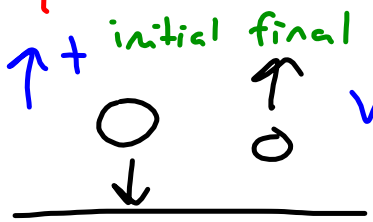
Impulse magnitude _____ direction _____

Final velocity magnitude _____ direction ____

$\Delta \bar{v} = \bar{v}_f - \bar{v}_i$

$\bar{J} = \bar{F}\Delta t = \Delta \bar{p} = m\,\Delta \bar{v} = m(\bar{v}_f - \bar{v}_i)$

impulse, force, time, change in momentum, mass, change in velocity



$v_i = -12\ m/s$

$\Delta t = 0.02\ s$

$\bar{F} = 400\ N$

$m = 0.5\ kg$

$\bar{J} = \bar{F}\Delta t$

$= (400\ N)(0.02\ s)$

$= 8\ kg \cdot m/s$

$\bar{J} = m\Delta \bar{v}$

$\bar{J} = m(\bar{v}_f - \bar{v}_i)$

$\frac{\bar{J}}{m} = \bar{v}_f - \bar{v}_i = \bar{v}_f + 12\ m/s$

$\frac{\bar{J}}{m} - 12\ m/s = \frac{\bar{J}}{m} + \bar{v}_i = \bar{v}_f$

$\frac{8\ kg \cdot m/s}{0.5\ kg} - 12\ m/s = \bar{v}_f$

$\bar{v}_f = 4\ m/s$

Dish A is dropped on a tile floor and dish B is dropped on carpet from equal heights. Both stop without rebounding.

Which one has a larger change in momentum? (A, B, same) SAME

Which one has a larger force acting on it? (A, B, same) _____

$$\Delta \bar{p} = \bar{p}_f - \bar{p}_i$$

$$= m\bar{v}_f - m\bar{v}_i$$

$$\bar{F}\Delta t = \Delta \bar{p}$$

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