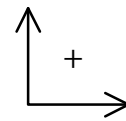


P11 - 5.1 - Momentum



What is the momentum of a 15kg object moving at $2 \frac{m}{s}$.

$p = ? = 30Ns$
 $v = 2 \frac{m}{s}$
 $15 \rightarrow$
 $t = 3$

$p = mv$
 $p = 15 \times 2$
 $p = 30 \frac{kgm}{s}$

$p = mv$
 $\frac{kgm}{s} = Ns$

A 1kg ball with a $v = 12 \frac{m}{s}$ is thrown at a wall. Find Impulse (Change in Momentum Δp)

$v = 12 \frac{m}{s}$
 $v = 0$
 $1 \rightarrow$

$\Delta p = m\Delta v$
 $\Delta p = m(v_f - v_i)$
 $\Delta p = 1(0 - 12)$
 $\Delta p = -12 \frac{kgm}{s}$

$\Delta p = m\Delta v$

Notice the Δp is Negative.

A 2kg ball with a $v = 11 \frac{m}{s}$ is thrown at a wall where bounces off the wall at $8 \frac{m}{s}$. Find Δp .

$v = 11 \frac{m}{s}$
 $v = 0$
 $1 \rightarrow$
Before

$v = -8 \frac{m}{s}$
 $1 \leftarrow$
After

$\Delta p = m\Delta v$
 $\Delta p = m(v_f - v_i)$
 $\Delta p = 2(-8 - (11))$
 $\Delta p = -38 \frac{kgm}{s}$

$\Delta p = m\Delta v$

A 0.1kg piece of Gum is thrown directly at a wall at $v = 5 \frac{m}{s}$ where it sticks to the wall and smushes in 0.2s. Find the Net Force exerted on the Wall by the Gum.

$\Delta p = F_{net}t$
 $m\Delta v = F_{net}t$
 $F_{net} = \frac{m\Delta v}{t}$
 $F_{net} = \frac{0.1(0 - 5)}{0.2}$
 $F_{net} = -2.5 N$

$\Delta v = v_f - v_i$
 $F_{net} = ma$
 $F_{net} = m \frac{\Delta v}{t}$
 $F_{net} \times t = m\Delta v$
 $F_{net}t = \Delta p$

$a = \frac{\Delta v}{t}$

$\Delta p = F_{net}t$

A Pitcher throws a 0.15 kg Ball at a $v = 21 \frac{m}{s}$ directly at a Catcher who Stops the Ball exerting a Force of 25 N on the Ball. How long does it take the ball to stop?

$\Delta p = F_{net}t$
 $m\Delta v = F_{net}t$
 $t = \frac{m\Delta v}{F_{net}}$
 $t = \frac{0.15 \times (0 - 21)}{-25}$
 $t = 0.126 s$