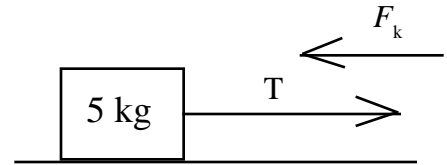


Impulse and Momentum Q6.0H

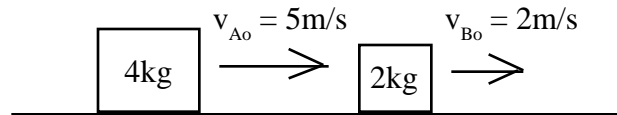
1. A rope with $T = 12\text{N}$ pulls a block across a floor for 5 seconds. There is also a constant kinetic friction force of 9N .

- What is the net force on the block?
- What is the impulse given by the rope?
- What is the impulse due to friction?
- What is the net impulse, J_{NET} ?
- If the initial velocity of the block is 3m/s , what is v_f after 5 seconds?



2. On a railroad track, mass A makes an inelastic collision with mass B. Find the final velocities for A and B if $m_A = 500\text{kg}$, $m_B = 200\text{kg}$, $v_{A0} = 8\text{m/s}$ and $v_{B0} = -10\text{m/s}$.

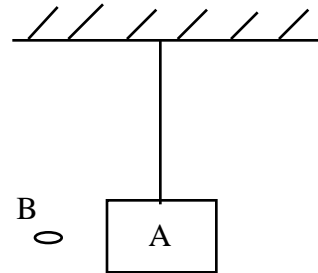
3. The two masses shown at the right make an elastic, head-on collision. Determine their final velocities after the collision.



4. $m_A = 40\text{kg}$ and $\vec{v}_{A0} = (4, -3)\frac{m}{s}$. $m_B = 50\text{kg}$ and $\vec{v}_{B0} = 10\frac{m}{s}$, $\theta = 30^\circ$.

The two masses make an inelastic collision at the origin. Determine their final velocity.

5. The mass of the bullet is 6g . The mass of the block is $.4\text{kg}$. Find the initial velocity of the bullet, v_{B0} , if it sticks into the block, and together A and B rise 8cm . The length of this ballistic pendulum is 3m .



6. If a red wagon is moving without friction at a constant velocity and it starts to rain, how does its speed change as the rain falls vertically into the wagon. What force if any gives impulse to the rain water? (Other than the force of gravity.) What happens to the speed of the wagon if the water leaks out and it stops raining?

7. A physics student is sliding at 3m/s on an ice pond toward a hole in the ice. If the mass of the student is 50kg and the mass of her physics book is 5kg , how fast and in what direction does she have to throw the book to stop herself?

8. Anna is trying to get her physics book and herself off the ice pond! She is 15m from the book and begins to pull the book toward herself. She knows that if she gets within 12m of the book's original position, the ice will crack and she will fall in. Her mass is 50kg and $m_B = 10\text{kg}$ (an honors textbook!). Does Anna ever get off this frictionless ice pond? If so, how?

