Tuesday Reading Assessment: Unit 8, Momentum

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1 Memory Bank

- $\vec{p} = m\vec{v}$ ... Definition of momentum.
- $\vec{p}_{\rm total} = \vec{p}_1 + \vec{p}_2$ ... Total momentum is the sum of two momenta.
- $\vec{p}_{\rm total,i} = \vec{p}_{\rm total,f}$ ... Momentum is conserved, like energy.

2 Momentum

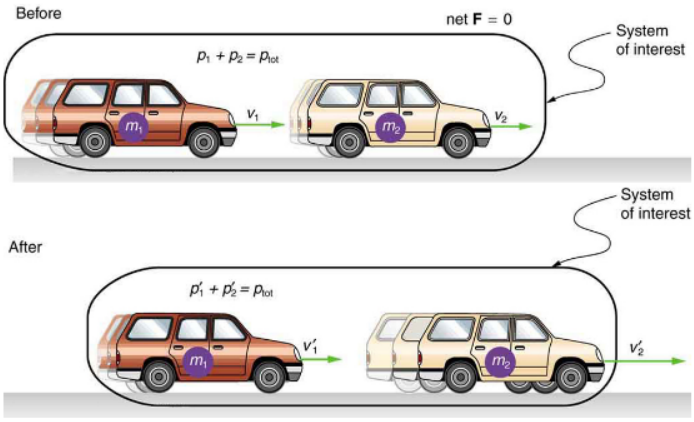

Figure 1: One car bumps another.

1. Suppose a hapless Whittier student is on their commute to class one morning when they are bumped by the car behind them (See Fig. 1). Suppose $m_1 = 2000$ kg, and $m_2 = 1400$ kg. (a) If the initial velocity of the car with m_1 is 4 m/s, what is its initial momentum? (b) If the initial velocity of the Whittier student's car with mass m_2 is 0 m/s, what is its initial momentum? (c) What is the total initial momentum? (d) If the final speed of the car with m_1 is 2 m/s, what is the final speed of the Whittier student's car with m_2 ?

2. In the above problem, is the initial total kinetic energy the same as the final total kinetic energy? What is the change in kinetic energy?