Answer on Question #59211, Physics / Mechanics | Relativity |

Car A of mass 1000 kg moving at 20m/s collides with a car B of mass 1200 kg moving at 10m/s in same direction. If the car B is shunted towards at 15m/s by the impact, what is the velocity, v, of the car A immediately after the crash?

Solution:

Given:

$m_1 = 1000\ \text{kg},$

$m_2 = 1200\ \text{kg},$

$v_{1i} = 20\ \text{m/s},$

$v_{2i} = 10\ \text{m/s},$

$v_{2f} = 15\ \text{m/s},$

$v_{1f} = ?$

The equation that denotes the conservation of momentum is:

$$\textbf{Momentum before collision} = \textbf{Momentum after collision}$$

$$m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$$

where, m_1 = mass of car A

m_2 = mass of car B

v_{1i} = initial velocity of car A

v_{2i}= initial velocity of car B

v_{2f} = final velocity of car B

From above equation we have,

$$v_{1f} = \frac{m_1 v_{1i} + m_2 v_{2i} - m_2 v_{2f}}{m_1}$$

$$v_{2f} = \frac{1000 \cdot 20 + 1200 \cdot 10 - 1200 \cdot 15}{1000} = 14\ \text{m/s}$$

Answer: $14\ \text{m/s}.$