19. Given

$m_1 = 0.035\,kg$

$m_2 = 5\,kg$

$v_{10} = ?$

$v_{20} = 0$

$v_1 = 8.6\,\frac{m}{s}$

$v_2 = 8.6\,\frac{m}{s}$

19. A 35.0-g bullet strikes a 5.0-kg stationary piece of lumber and embeds itself in the wood. The piece of lumber and the bullet fly off together at 8.6 m/s. What was the speed of the bullet before it struck the lumber? Define the bullet and the wood as a system.

P = mV

zero

$\vec{p}_0 = \vec{p}$

$m_1 \cdot \vec{v}_{10} + m_2 \cdot \vec{v}_{20} = m_1 \cdot \vec{v}_1 + m_2 \cdot \vec{v}_2$

$0.035 \times v_{10} = 0.035 \times 8.6 + 5 \times 8.6$

$0.035\, v_{10} = 43.301$

$v_{10} = \frac{43.301}{0.035} = 1237\,\frac{m}{s}$ (East)

17. Two freight cars, each with a mass of 3.0×10^5 kg, collide and stick together. One was initially moving at 2.2 m/s, and the other was at rest. What is their final speed? Define the system as the two cars.

P = m.V

17. Given

$m_1 = m_2 = 3 \times 10^5\,kg$

$v_{10} = 2.2\,\frac{m}{s}$

$v_{20} = 0$

$v_1 = v_2 = v_{12} = ?$

$P_0 = P$ (Common factor)

$m_1 v_{10} + m_2 v_{20} = m_1 v_1 + m_2 v_2$

zero

$3 \times 10^5 \times 2.2 = v_{12}(3 \times 10^5 + 3 \times 10^5)$

$3 \times 10^5 \times 2.2 = v_{12} \times 2 \times 3 \times 10^5$

$\frac{2.2}{2} = v_{12} = 1.1\,\frac{m}{s}$ (East)

18. A 0.105-kg hockey puck moving at 24 m/s is caught and held by a 75-kg goalie at rest. With what speed does the goalie slide on the ice after catching the puck? Define the puck and the goalie as a system.

NEXT ONE post the answer, SHOW ALL WORK, in your Handouts tab

20. A 35.0-g bullet moving at 475 m/s strikes a 2.5-kg bag of flour at rest on ice. The bullet passes through the bag and exits it at 275 m/s. How fast is the bag moving when the bullet exits?

First ------>

$\vec{p}_0 = \vec{p}$

$m_1 \cdot \vec{v}_{10} + m_2 \cdot \vec{v}_{20} = m_1 \cdot \vec{v}_1 + m_2 \cdot \vec{v}_2$

Your Turn.....

$v_2 = 2.8\,\frac{m}{s}$ the answer

20. A 35.0-g bullet moving at 475 m/s strikes a 2.5-kg bag of flour at rest on ice. The bullet passes through the bag and exits it at 275 m/s. How fast is the bag moving when the bullet exits?

21. The bullet in the previous problem strikes a 2.5-kg steel ball that is at rest. After the collision, the bullet bounces backward at 5.0 m/s. How fast is the ball moving when the bullet bounces backward?

$m_1 = 0.035\,kg$

$m_2 = 2.5\,kg$

$v_{10} = 475\,\frac{m}{s}$

$v_{20} = 0$

$v_1 = -5\,\frac{m}{s}$

$v_2 = ?$

zero

$\vec{p}_0 = \vec{p}$

$m_1 \cdot \vec{v}_{10} + m_2 \cdot \vec{v}_{20} = m_1 \cdot \vec{v}_1 + m_2 \cdot \vec{v}_2$

$0.035 \cdot 475 = 0.035(-5) + 2.5 \times v_2$

$16.625 = -0.175 + 2.5 \times v_2$

$\frac{16.8}{2.5} = v_2 = 6.72\,\frac{m}{s}$

CHECK THE HW TAB, due next class, 4/17/2024