Name (Print) Bertonina Name (Signed) 

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Discussion Section #: Lakner Pollard

REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

(a) A ball of mass 1.20 kg moves to the left with a velocity of 9.70 m/s. It strikes a wall, and bounces directly back with a velocity of 8.75 m/s. Calculate the magnitude of the impulse given to the ball by the wall.

\[
\vec{F} = \Delta \vec{p} = m(\vec{V}_f - \vec{V}_i) = 1.20 \text{kg} (8.75 - (-9.70)) \text{m/s} = 22.1 \text{kg m/s}
\]

(b) Calculate the amount of energy converted to heat in the impact above.

\[
\text{Heat} = \Delta K = \frac{1}{2} m (V_f^2 - V_i^2) = \frac{1}{2} (1.20 \text{kg}) (9.70 \text{m/s})^2 - (8.75 \text{m/s})^2 = 10.5 \text{ J or 10.51 J}
\]

(c) Convert 375 ft·pounds into the proper SI unit.

\[
\left(\frac{375 \text{ ft} \cdot \text{lb}}{1 \text{ m} \cdot \text{N}} \right) = \left(\frac{1 \text{ m}}{3.28 \text{ ft}} \cdot \frac{1 \text{ N}}{0.23 \text{ lb}} \right) = 508 \text{ N} \cdot \text{m}
\]

(d) A football player of mass 100 kg is moving with a speed of 8.75 m/s. Calculate the magnitude of his momentum.

\[
|\vec{p}| = m |\vec{V}| = (100 \text{kg})(8.75 \text{m/s}) = 875 \text{kg} \cdot \text{m/s}
\]

(e) Find the x coordinate of the center of mass of a system consisting of 1.25 kg at \(x = -1.00\) m; 2.75 kg at \(x = +1.50\) m and 3.25 kg at \(x = +2.25\) m.

\[
X_{cm} = \frac{(-1.0 \text{m})(1.25 \text{kg}) + (1.50 \text{m})(2.75 \text{kg}) + (2.25 \text{m})(3.25 \text{kg})}{1.25 + 2.75 + 3.25} = 1.405 \text{ m or } 1.40 \text{ m or } 1.41 \text{ m}
\]