

①

An 8.0 kg air puck traveling at 15 cm/s to the right collides with a 2.0 kg puck traveling left at 25 cm/s. If the two pucks stick together after the collision because of some glue that sets very quickly during the collision determine the following.

(1) Velocity after impact.

(2) Kinetic energy lost during the collision.

$$\begin{aligned}
 (1) \quad p_0 &= m_1 v_1 + m_2 v_2 \\
 p_0 &= 8.0 \text{ kg} (0.15 \text{ m/s}) + 2.0 \text{ kg} (-0.25 \text{ m/s}) \\
 &= 7.0 \text{ E-1 kg} \frac{\text{m}}{\text{s}}
 \end{aligned}$$

$$\begin{aligned}
 p &= (m_1 + m_2) v \\
 &= 10.0 \text{ kg} v
 \end{aligned}$$

$$p = p_0$$

$$(10.0 \text{ kg})v = 7.0 \text{ E-1 kg} \frac{\text{m}}{\text{s}}$$

$$v = \boxed{7.0 \text{ E-2} \frac{\text{m}}{\text{s}}}$$
$$= 0.070 \frac{\text{m}}{\text{s}}$$

(2)

$$E_{k_0} = \frac{1}{2} m_1 v_{1_0}^2 + \frac{1}{2} m_2 v_{2_0}^2$$

$$= \frac{1}{2} (8.0 \text{ kg}) (0.15 \frac{\text{m}}{\text{s}})^2 + \frac{1}{2} (2.0 \text{ kg}) (-0.25 \frac{\text{m}}{\text{s}})^2$$

$$= \underline{1.525 \text{ E-1 J}}$$

$$E_k = \frac{1}{2} m_c v^2$$

$$= \frac{1}{2} (10.0 \text{ kg}) (7.0 \text{ E-2} \frac{\text{m}}{\text{s}})^2$$

$$= \underline{2.45 \text{ E-2 J}}$$

$$\Delta E_k = E_k - E_{k_0} = 2.45 \text{ E-2 J} - 1.525 \text{ E-1 J} = \underline{-1.28 \text{ E-1 J}}$$