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This is a problem involving momentum.

A 40 ton train car collides with another train car that is stationary. The two cars couple together as a result, and 32% of the initial kinetic energy is lost during the collision. Determine the mass of the second train car.

Solution:

Linear momentum is conserved:

$$m_1 v_1 = (m_1 + m_2) V \quad (1)$$

(completely inelastic collision, where both cars move together)

Before the collision:

$$KE_1 = \frac{1}{2} m_1 v_1^2$$

After the collision:

$$KE_2 = \frac{1}{2} (m_1 + m_2) V^2$$

It's given that $KE_2 = (1 - 0.32) KE_1$

$$\text{So, } \frac{KE_2}{KE_1} = 0.68$$

$$\Rightarrow \left(\frac{m_1 + m_2}{m_1} \right) \left(\frac{V}{v_1} \right)^2 = 0.68 \quad (2)$$

Substitute equation (1) into equation (2):

$$\left(\frac{m_1+m_2}{m_1}\right)\left(\frac{m_1}{m_1+m_2}\right)^2 = 0.68$$

$$\Rightarrow \frac{m_1}{m_1+m_2} = 0.68$$

$$m_1 = 40 \text{ ton}$$

$$\Rightarrow \frac{40}{40+m_2} = 0.68$$

$$\Rightarrow m_2 = 18.8 \text{ tons} \quad \text{(answer)}$$