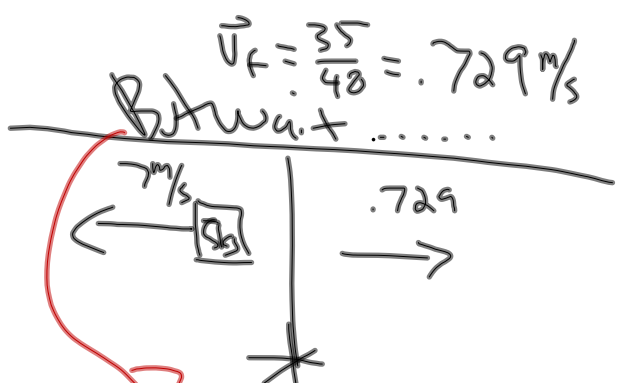
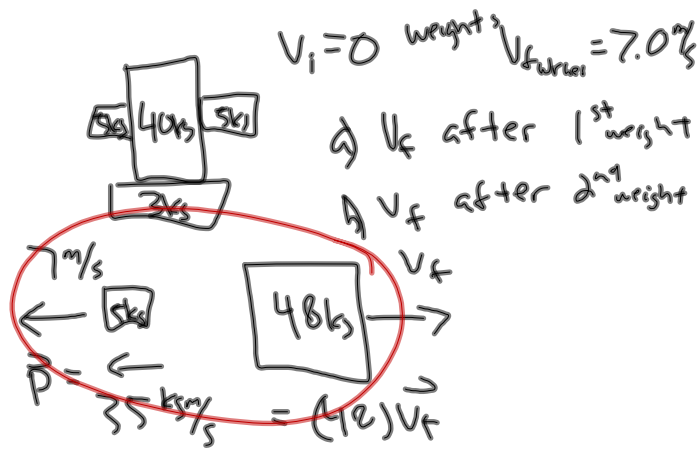


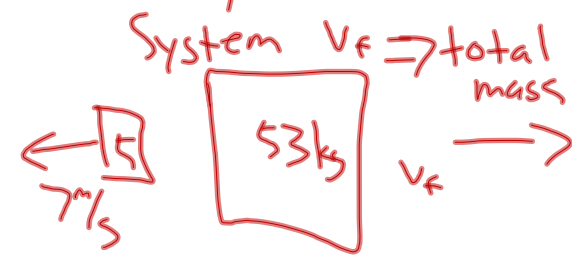
Systems

A fundamental property of nature is that if there are no net external forces acting on a system or they are negligible as far as affecting the particles in the system, then the total momentum of the system is conserved.

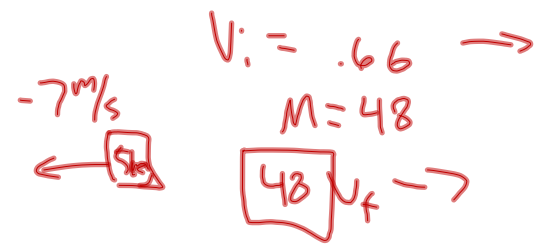


we defined system as her skateboard + both weights.

therefore



$$V_f = \frac{35}{53} = .66 \text{ m/s}$$



$$\begin{aligned}
 (.66)(48) &= 48(V_f) + (5)(7) \\
 31.68 &= 48V_f - 35 \\
 V_f &= \frac{66.68}{48} = 1.4 \text{ m/s}
 \end{aligned}$$

$$K_{sys} = \frac{1}{2} M V_{cm}^2 + K_{rel}$$

ex.

$$= \frac{1}{2} (48) \cdot 66^2$$

$$+ \frac{1}{2} (5) (7)^2$$

↑
K of each
mass
rel. to
center of
mass.

P. 8.4

1 m/s
→

A

B

1 kg

1 kg

$$V_{cm} = ?$$

$$M V_{cm} = m_1 v_1 + m_2 v_2$$

$$2 V_{cm} = 1 \text{ kg m/s} + 0$$

$$V_{cm} = +\frac{1}{2} \text{ m/s}$$

$$V_{bcm} = -\frac{1}{2} \text{ m/s}$$

$$K = \frac{1}{2} m v^2 = \left(\frac{1}{2}\right) (1) \left(\frac{1}{2}\right)^2$$

$$K_A = K_B = \frac{1}{8} = .125$$

$$K_{tot} = .25$$

$$K_{tot, rel, cm} = 0$$