

Ch 3

Sec 3.3A

obj: When is momentum conserved?

Momentum

- Quantity of constant motion.
 - * constant velocity
- 2 Factors affect the momentum of an object.
 - 1) Mass (Inertia)
 - 2) velocity

$$p = mv$$

(kg · m/s) unit for momentum

Known

$$m = 80 \text{ kg}$$

$$v = 2 \text{ m/s}$$

Unknown

$$p = ?$$

$$\begin{aligned}
 p &= mv \\
 &= 80 \text{ kg} (2.0 \text{ m/s}) \\
 &= 160 \text{ kg} \cdot \text{m/s}
 \end{aligned}$$

- Momentum has a direction because velocity has direction.

* momentum is a vector quantity.

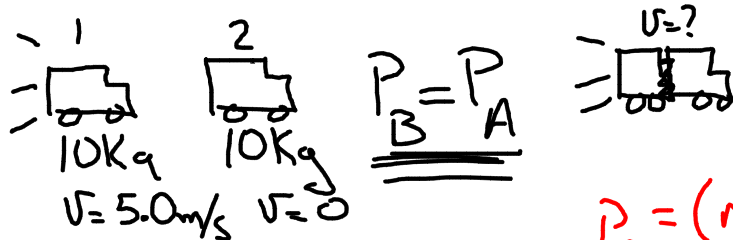
- To change momentum there must be an impulse.

* An impulse is the product of net force and time of contact

$$F_{\text{net}} t = \text{impulse} = \Delta p$$

Conservation of Momentum

- The momentum in a system will not change unless an outside force acts on it.
- Momentum of a system is transferred from 1 object to another
- The momentum before a collision will equal the momentum after the collision.



$$P = m v$$

$$P_B = 10 \text{ kg} (5.0 \text{ m/s})$$

$$= 50 \text{ kg m/s}$$

$$P_A = (m_1 + m_2) v$$

$$\frac{50 \text{ kg} \cdot \text{m/s}}{20 \text{ kg}} = \frac{20 \text{ kg} (v)}{20 \text{ kg}}$$

$$2.5 \text{ m/s} = v$$