NOTES

MOMENTUM

DEFINITION

Momentum = force of motion described by an object's mass and velocity.

Impulse = change in momentum

FORMULA

$$\rho = mv \qquad \text{(kg-m/s)}$$
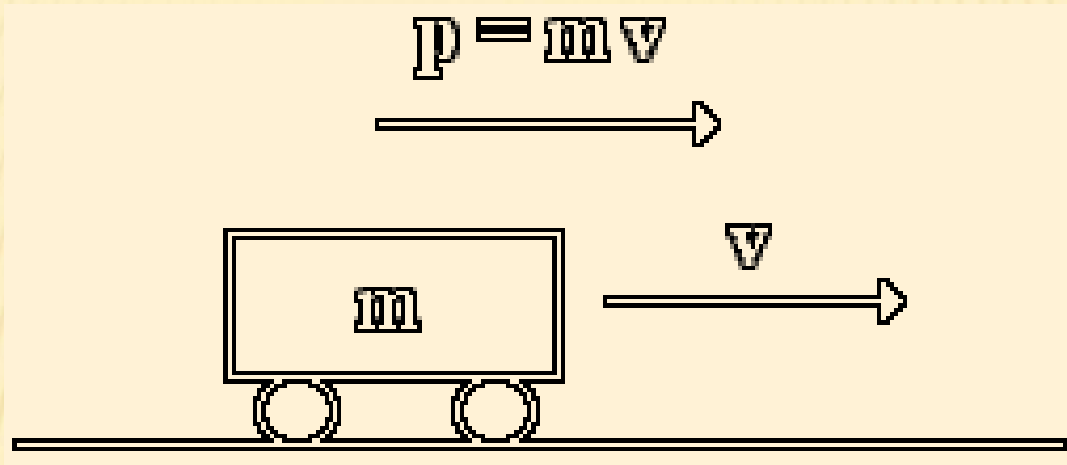
✖ Momentum is a Vector

✖ It is in the same direction as the velocity of the object

MOMENTUM - ρ

VELOCITY - v

MOMENTUM = MASS X VELOCITY

$$p = mv$$

- Unit for momentum is (kg-m/s)
- ρ = (100kg)(25m/s)
- ρ = 2500 kg-m/s

MOMENTUM IS DIRECTLY PROPORTIONAL TO VELOCITY.

- If the velocity doubles, the momentum doubles

- ρ = (8kg)(5m/s)

- ρ = <u>40</u> kg-m/s   *then*

- ρ = (8kg)(**10**m/s)

- ρ = <u>80</u> kg-m/s

✖ MORE MASS = MORE MOMENTUM

CONSERVATION OF MOMENTUM

- Momentum of 2 objects before they collide will be the same as the momentum of the objects combined after they collide

IN AN INELASTIC COLLISION

$$m_1v_1 \quad + \quad m_2v_2 \quad = \quad (m_1+m_2)v$$

SAMPLE PROBLEM

A 10kg object traveling to the right at 5m/s collides and sticks to a 5kg object in front of it also traveling to the right but at 3m/s. What is the velocity of the two objects that are stuck together?

G m_1=10kg m_2=5kg v_1=5m/s v_2=3m/s

U   final velocity ?

E $m_1v_1 + m_2v_2 = (m_1+m_2)v$

S   (10kg)(5m/s) + (5kg)(3m/s) = (10kg+5kg) v

S   50 kg-m/s + 15 kg-m/s =   (15 kg) v

$$\frac{65 \text{ kg-m/s}}{15 \text{ kg}} = v$$

4.33m/s = v