II. LAW OF _____

In a closed system:

Collision Problems

Example 1) A 3 kg object traveling 6 m/s east has a perfectly elastic collision with a 4 kg object traveling 8 m/s west. After the collision, the 3 kg object will travel 10 m/s west.

1) Find the total momentum **BEFORE** the collision.

Total momentum before =

2) What is the total momentum **after** the collision?

3) What is the velocity of the 4 kg object after the collision?

Example 2) A 10kg Block A moves with a velocity of 2 m/s to the right and collides with a 10 kg Block **B** which is at rest. After the collision Block **A** stops moving and Block B moves to the right.

a) Find the total momentum after the collision

b) Find the velocity of Block B **after** the collision.

Example 3) A 10 kg cart moving with a velocity of 10 m/s East collides and attaches itself to a 10 kg cart moving at a velocity of 50 m/s west.

Draw a quick picture

1) Find the total momentum before the collision

2) Find the total momentum after the collision

3) What is the velocity of the attached carts after the collision?

B) Recoil Problem - When interacting objects start from rest

Example 1) A 4 kg rifle fires a 5 x 10^{-3} kg bullet at a velocity of 500 m/s. What is the velocity acquired by the rifle?

Total Momentum Before Interaction = **Total Momentum After Interaction**

Why is the total momentum before Zero???

Subtract m_2v_2 from both sides

In problem Solving, remove negative sign and use

(Not in Reference Table) *********

Important: Regents almost always has an question that asks you to use this equation

Example 2) 2 magnets of 1 kg and .5 kg are arranged **at rest** on a horizontal frictionless surface. When the strings holding them together is cut they move apart under the magnetic force of repulsion.

a) What is the total momentum of the magnets before the string is cut?

b) What is the total momentum of the magnets after the string is cut?

c) What is the velocity of the .5 kg mass when the velocity of the 1 kg magnet is 30 m/s?