

IMPORTANT TERMS:

- Action force
- Interaction
- Newton's third law
- Reaction force

EQUATIONS:

$$p = mv$$

$$Ft = \Delta(mv)$$

$$(\text{net } mv)_{\text{before}} = (\text{net } mv)_{\text{after}}$$

UNIT I: MECHANICS

Chapter 8: Momentum

I. Momentum (8.1)

A. **momentum**– “_____ in motion”

1. Mass of an object multiplied by its velocity

Momentum = mass x velocity

2. A moving object can have large momentum with either _____ or _____

B. An object at **rest** has _____ **momentum** (velocity = 0)

II. Impulse Changes Momentum (8.2)

A. The **greater the force** on an object the **greater the change** in _____

1. Apply force over **longer** _____ and produce greater change in momentum

a. Force x time = _____

b. **Impulse = change in** _____

2. The greater the **impulse** on something, the greater the change in _____

B. Increasing Momentum

1. To increase **momentum** of object apply **greatest force** for as _____

2. Impact forces– means average force of impact

a. **Impact** refers to a _____ (measured in **N**)

b. **Impulse**-Impact force x time (measured in **N-s**)

C. Decreasing Momentum

1. Longer impact time **reduces** _____ of impact and decreases the resulting _____.

2. Extend **impact time** to reduce impact _____

a. evident in design of cars

b. evident when looking at floors (concrete, wood, etc.)

III. Bouncing (8.3)-impulses are greater when bouncing takes place

IV. Conservation of Momentum (8.4)

A. To **accelerate** an object you **must apply a** _____ to it

B. To **change momentum** of an object, you must **exert an** _____ to it.

C. In either case, the **force** or **impulse** must be exerted by something _____ the object.

1. _____ forces won't work

2. **Internal forces** come in **balanced** _____ and cancel within the object

3. If no external force is present - no change in _____ is possible.

D. Cannon example

1. Cannon at rest—**momentum** = _____ (velocity is 0)

2. After firing - net momentum (or total momentum) is **still** _____.

E. Momentum is a vector quantity

1. has both _____ and _____

2. Therefore they can be _____

3. Magnitude of cannon ball and cannon are **equal and opposite in direction** (they cancel each other)

4. **If no net force or net impulse acts on a system the momentum of that system cannot change**

5. **Law of conservation of momentum—**

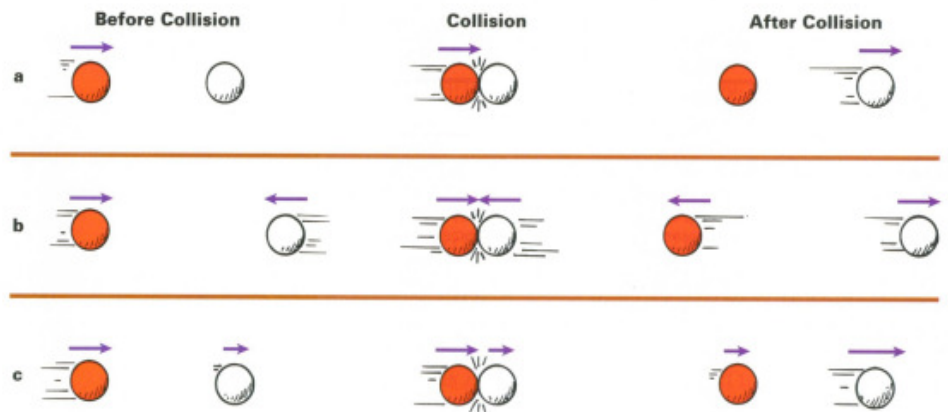
In the absence of an external force, the momentum of a system remains unchanged

V. Collisions (8.5)

A. **Elastic Collisions—** *when objects collide without being-*

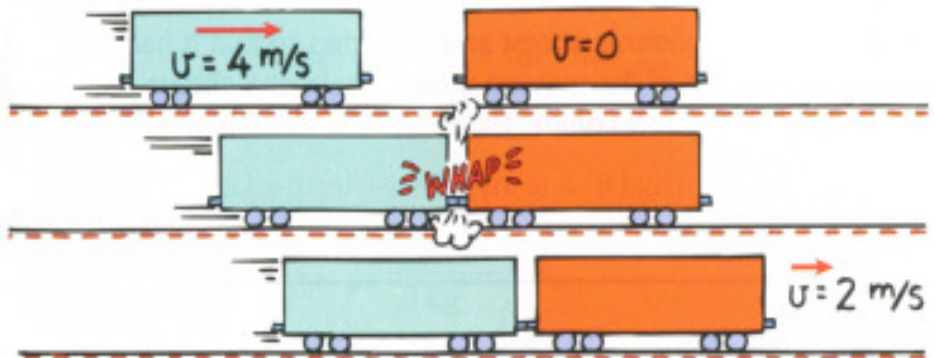
1. Momentum is _____ from first object to second.

2. **Sum of momentum vectors** is the **same** before and after each collision



B. Inelastic Collisions

1. **Inelastic Collisions**- *Objects become distorted and generate heat during the collision (objects become tangled or couple together)*



2. You can **predict velocity** of the coupled objects after impact

net momentum before collision = **net momentum** after collision

Or in equation form

3. Most collisions usually involve some **external** _____

a. Most external forces are _____ during collision

b. _____ may play a role after collisions

C. Perfect elastic collisions are not common in everyday world

1. _____ is usually generated
2. Perfectly elastic collisions commonplace at a _____ **level** (e.g. electrically charged particles)

VI. Momentum Vectors (8.6)

A. Momentum _____ even if interacting objects don't move along the same _____

1. Use _____ to analyze
2. **Momentum** is the _____ of two objects

