

# Chapter C3: Interactions Transfer Momentum

## C3.1: Velocity

It's ok to interchange  $dt$  and  $\Delta t$ .

A note on notation:  $\equiv \neq =$ .

- “ $\equiv$ ” means “is defined to be.”
- “ $=$ ” means is equal to.

## C3.2: Interactions Transfer Momentum

- Remember: interactions always involve two objects.
- Definition of momentum:  $\vec{p} \equiv m\vec{v}$ .
- Momentum-transfer principle: *Any interaction between two objects affects their motion by transferring momentum from one to the other.* This is the key idea of the section.

## C3.3: Impulse and Force

- The impulse  $[d\vec{p}]_A$  is defined as the amount of momentum that a particular interaction  $A$  delivers to an object in a short time interval.
- If this interaction transfers momentum continuously, then we define the *rate* of this transfer as the *force*

$$\vec{F}_A \equiv \frac{[d\vec{p}]_A}{dt} . \quad (1)$$

- The unit of Force is the *Newton*:

$$1\text{N} \equiv \frac{\text{kg m}}{\text{s}^2} . \quad (2)$$

- Multiple impulses add:

$$d\vec{p} = [d\vec{p}]_A + [d\vec{p}]_B + \cdots . \quad (3)$$

### C3.4: Mass and Weight

- Mass is an object's resistance to changes in its motion
- It is defined operationally in the book; we'll do this in lab.
- Weight is different than mass. Weight is the force exerted on an object via the gravitational interaction:

$$\vec{F}_f = m\vec{g} , \quad (4)$$

where  $\vec{g}$  is the gravitational field vector.

### C3.5: Momentum Flow and Motion

I like the figures in this chapter.

### C3.6: Illegal Vector Equations

This section has some good “parental” advice.