# **Motion in a Straight Line Notes**

# **I. Distance and displacement**

# A. **Point of reference** – Object that the motion of another object

# is compared to.

B. **Distance** – describes how far an object has traveled.

1. Distance is a **scalar quantity** – it is described by its

size or **magnitude**.

C. **Displacement** – the distance and direction an object is from

its starting point.

1. Displacement is a **vector quantity** – it is described by its

**magnitude** and **direction**.

2. Magnitude is shown by the length of the arrow.

3. Vectors in the **same** direction are **added** together.

4. Vectors in **opposite** directions are **subtracted**.

5. Arrow showing the final displacement is called the **resultant**.

**II.** **Speed** – the distance an object travels per unit time. It is a scalar

quantity.

Speed = distance

time

A. **Average speed** = total distance traveled or dfinal - dinitial

total time traveling tfinal - tinitial

B. **Constant speed** - an object that is neither speeding up nor

slowing down.

C. **Instantaneous speed** – an object’s speed at any given

instant

D. **Velocity** includes both an object’s speed and direction, so it is

a vector quantity

velocity = displacement or **df** - **di** or Δ **d**

time tf - ti Δ t

**III.** **Acceleration** – rate at which the velocity (speed or direction) of

an object changes.

A. Acceleration is a **vector** quantity.

B. Velocity changes when an object:

- speeds up (positive acceleration)

- slows down, (negative acceleration or deceleration)

- changes direction.

C. Formula for acceleration:

a = vf - vi

t

 