

- I. The velocity of an object depends on the displacement, the time, and the direction of travel.
- II. An object's velocity can change if the object slows down, or speeds up, or if it changes direction.

Two cars traveling on Hall road, one is traveling west, while the other is traveling east, both have a speed of 55mph. Why are their velocities different?

- III. To calculate velocity we use the formula

$$V = \frac{\text{Change in Position}}{\text{Time}}$$

- IV. Remember when calculating velocity, time, or distance the units for each must be the same.

Example 1: Mary is traveling from Mount Clemens to East Point to see her grandmother; she travels a total of 25 miles in 30 minutes, what is her average velocity for the trip?

$$V = 25/0.5$$

$$V = 5\text{mph}$$

Example 2: Peter lives 35km meters east of the high school, Jessica lives 50 km meters west of the high school, calculate their velocities in km/hr if they both leave their houses at 7:00 and arrive at 8:30am.

$$V = 35/1.5$$

$$V = 50/1.5$$

$$V = 23.3 \text{ km/hr}$$

$$V = 33 \text{ km/hr}$$

- V. An object's momentum depends on its mass and its velocity.
- VI. To calculate momentum we need to know the mass and velocity of each object.

$$\text{Momentum} = \text{Mass} \times \text{Velocity}$$

Example 3: A semi truck is traveling east at a speed of 55mph, the total mass of the truck including its cargo is 50,000 kg. What is the momentum of the truck?

$$P = 50000 \times 55 \qquad p = 275000 \text{ (kg)(mph)}$$

Example 4: Two cars are traveling in opposite directions at the same speed; a green Chevy impala has a weight of 2 tons, while the white jeep Cherokee has a weight of 3 tons. Which vehicle has the greater momentum?

The Jeep because it has more mass, therefore it has more momentum.