

Name: _____ Period: _____ Date: _____

VELOCITY AND ACCELERATION NOTES

Velocity is speed in a given direction

- Therefore, knowing the velocity of a moving object means you know the distance, time, and direction.

Ex: An airplane is moving 885 km/h west to California.

True or False: You can affect the velocity of a moving object without affecting the speed.

Acceleration is the change in velocity of an object.

An object accelerates if it:

- speeds up (positive acceleration)
- slows down (negative acceleration, also referred to as deceleration)
- changes direction

True or False: An object that is traveling at a constant speed can be accelerating.

$$\text{Acceleration} = \frac{\text{Final velocity} - \text{Original velocity}}{\text{Total time}}$$

Ex: A car accelerates from rest to 27 m/s in 9 seconds. Find the car's average acceleration.

Original speed = 0 m/s

Final speed = 27 m/s

Time = 9 seconds

$$\text{Acceleration} = \frac{27 \text{ m/s} - 0 \text{ m/s}}{9 \text{ s}} = \frac{27 \text{ m/s}}{9 \text{ s}} = 3 \text{ m/s}^2$$

Note: If speed is measured in meters per second (m/s) and time is measured in seconds, the unit of acceleration is meters per second per second, or m/s².

Practice (show your work):

1. A falling raindrop accelerates from 10 m/s to 30 m/s in 2 seconds. What is the raindrop's average acceleration?

Final speed: 30 m/s

Original speed: 10 m/s

Time: 2 s

$$\frac{30-10}{2} = \frac{20}{2} = 10 \text{ m/s}^2$$

2. What is a race car's average acceleration if its speed changes from 0 m/s to 40 m/s in 4 seconds?

$$\frac{40-0}{4} = \frac{40}{4} = 10 \text{ m/s}^2$$

3. How can a car be accelerating if its speed is constant at 65 km/h?

The direction could be changing (car might be going around a curve in the road)