

Lesson 11.2 – Speed and Velocity

(A) Speed and Velocity

Speed is a scalar quantity which refers to "how fast an object is moving." Speed can be thought of as the rate at which an object covers distance.

Velocity is a vector quantity which refers to "the rate at which an object changes its position." When evaluating the velocity of an object, one must keep track of direction.

(B) Speed/Velocity and d/t Graphs

The speed/velocity of an object can be determined from a d/t graph by calculating its slope

(C) Calculating Average Speed and Average Velocity

The average speed during the course of a motion is often computed using the following formula:

$$\text{average speed} = \frac{d(t_2) - d(t_1)}{t_2 - t_1} = \frac{\text{distance traveled}}{\text{time of travel}}$$

Meanwhile, the average velocity is often computed using the equation

$$\text{average velocity} = \frac{d(t_2) - d(t_1)}{t_2 - t_1} = \frac{\text{change in position}}{\text{time of travel}} = \frac{\text{displacement}}{\text{time}}$$

(D) Average Speed versus Instantaneous Speed

Since a moving object often changes its speed during its motion, it is common to distinguish between the average speed and the instantaneous speed. The distinction is as follows.

Instantaneous Speed - the speed at any given instant in time.

Average Speed - the average of all instantaneous speeds; found simply by a distance/time ratio.

(A) Speed and Velocity

Speed:

Velocity

(B) Speed/Velocity and d/t Graphs

(C) Calculating Average Speed and Average Velocity

The average speed during the course of a motion is often computed using the following formula:

Meanwhile, the average velocity is often computed using the equation

(D) Average Speed versus Instantaneous Speed

Since a moving object often changes its speed during its motion, it is common to distinguish between the average speed and the instantaneous speed. The distinction is as follows.

Instantaneous Speed

Average Speed
