

Physics 161
Elements of Physics
Fall 2017

Lecture 1

Course web page contains all the administrative information you need

<http://physics.rutgers.edu/ugrad/161/>

Lecture 1: learning objectives

You will be able to define the terms displacement, and average and instantaneous velocity and acceleration. You can apply them to solve problems involving motion in one dimension.

One-dimensional motion

Displacement:

The distance and direction between a particle's final position and its initial position.

$$\Delta x = x_f - x_i$$

Average velocity (between two times):

Displacement divided by the difference of the times

$$\bar{v} = \Delta x / \Delta t = \frac{x_f - x_i}{t_f - t_i}$$

Instantaneous velocity (at a particular time):

The limit of the average velocity as the time interval vanishes, or $\Delta t \rightarrow 0$.

$$v = \lim_{\Delta t \rightarrow 0} \frac{\Delta x}{\Delta t}$$

One-dimensional motion

Average acceleration (between two times):

Velocity divided by the difference of the times:

$$\bar{a} = \Delta v / \Delta t = \frac{v_f - v_i}{t_f - t_i}$$

Instantaneous acceleration (at a particular time):

The limit of the average acceleration as the time interval vanishes, or $\Delta t \rightarrow 0$.

$$a = \lim_{\Delta t \rightarrow 0} \frac{\Delta v}{\Delta t}$$