

Constant Acceleration Particle (CAP) Unit Objectives

What you should know and be able to do by the end of the unit.

1. You should be able to determine the **instantaneous velocity** of an object in three ways:
 - a. determining the slope of the tangent to an **x vs. t** graph at a given point.
 - b. using the mathematical model (equation): $v_f = at + v_i$
 - c. using the mathematical model: $v_f^2 = v_i^2 + 2ax$
2. You should be able to determine the **displacement** of an object in three ways:
 - a. finding the area between a **v vs. t** function and the time axis
 - b. using the mathematical model: $\Delta x = \frac{1}{2} a t^2 + v_i t$
 - c. using the mathematical model: $v_f^2 = v_i^2 + 2ax$
3. You should be able to determine the **acceleration** of an object in five ways:
 - a. finding the slope of a **v vs. t** graph
 - b. using the mathematical model: $a = \frac{\Delta v}{\Delta t}$
 - c. rearranging the mathematical model: $\Delta x = \frac{1}{2} a t^2 + v_i t$
 - d. rearranging the mathematical model: $v_f = at + v_i$
 - e. rearranging the mathematical model: $v_f^2 = v_i^2 + 2ax$
4. Given an **x vs. t** graph, you should be able to:
 - a. describe the object's motion (initial position, direction of motion, velocity, how velocity is changing)
 - b. draw the corresponding **v vs. t** graph
 - c. draw the corresponding **a vs. t** graph
 - d. draw a motion map for the object (including **v** and **a** vectors)
 - e. determine the instantaneous velocity of the object at a particular time
5. Given a **v vs. t** graph, you should be able to:
 - a. describe the motion of the object (direction of motion, speeding up, slowing down, acceleration)
 - b. draw the corresponding **x vs. t** graph
 - c. draw the corresponding **a vs. t** graph
 - d. draw a motion map for the object (including **v** and **a** vectors)
 - e. write the mathematical model to describe the motion
 - f. determine the acceleration
 - g. determine the displacement for a given time interval

• Additional Study Hints

Look over all our activities, worksheets, and questions of the day.

Form a study group and review together and quiz each other.