Chapter N4 Practice: Motion from Forces

Physics I

College of the Atlantic

1. On the other side of this paper are graphs of either velocity or acceleration versus time. For each, complete the kinematic chain with qualitatively accurate sketches.

2. An object starts at rest and then accelerates ag 10 m/s^2. Use graphs of acceleration, velocity, and position as a function of time to quantitatively answer the following questions:

   (a) What is the object's velocity after one second? two seconds? three seconds?
   (b) What is a formula that would give the object's velocity after t seconds?
   (c) What is the object's position after one second? two seconds? three seconds?
   (d) What is a formula that would give the object's position after t seconds?

3. A skydiver jumps out of an airplane. She falls toward the earth, and eventually reaches a constant velocity. For each of the following, sketch a free body diagram and net-force diagram:

   (a) The instant after she jumps out of the plane.
   (b) She's been falling for a little while, but hasn't reached her terminal velocity yet.
   (c) She's falling at her terminal velocity.

4. Make a sketch of the skydiver's y, v, and a vs. t.

5. An object starts at rest. It accelerates at 10 m/s^2 for five seconds. It then accelerates at -10 m/s^2 for three seconds. Sketch quantitatively accurate graphs for its acceleration, velocity, and position as a function of time.

6. A net force of 100 Newtons is applied to a 25 kg crate of tofu for 3 seconds. After 3 seconds there is no net force on the box. Sketch the acceleration, velocity, and position of the box.

7. You drop a TAB mug off a 30 meter cliff. How long does it take the mug to hit the ground?

8. You drop a 17 kg box of tempeh off a building. How high must the building be so that the tempeh falls for at least 5 seconds before hitting the ground?

9. You throw a 19 kg box of tempeh straight down off a 100 meter cliff. How long does it take to reach the bottom? How long does it take to fall half-way to the bottom?