

Name \_\_\_\_\_

Please work the problems on separate sheets of paper and staple this sheet to the front. Read each problem carefully. Show your work and/or give explanations for *all* answers. Make sure that your answers are given with a reasonable number of sig figs and that you have included appropriate units. Check your answers for physical *reasonableness*. I do give partial credit, but *only* if I can follow your work, so be as clear as possible about what you are doing.

1. A driver traveling at 40 m/s on the freeway sees a highway patrol car stopped on the side 70 m ahead and *instantly* applies the brakes. With a uniform acceleration, the car slows to 30 m/s just as it passes the highway patrol officer.
  - a) [10 pts] Draw a sketch showing the position and velocity of the car at the beginning and the end of the interval of interest and your chosen coordinate system.
  - b) [15 pts] What was the acceleration of the car?
2. [25 pts] Convert each of the following into SI units:
  - a) 65 mi/hr
  - b) 3.0 acre/mi
  - c)  $20 \frac{\text{ft/s}}{\text{hr}}$

Possibly useful information:  
1 mi = 5280 ft, 1 acre = 43,560 ft<sup>2</sup>, 1 ft = 12 in, 1 in = 2.54 cm, 1 slug = 14.6 kg
3. You take a walk consisting of the following three straight line segments:  
(1) 3.0 km, N; (2) 2.0 km, 30° S of W; (3) return to your starting point.
  - a) [5 pts] Draw a reasonably accurate vector diagram representing this walk.
  - b) [20 pts] Determine the magnitude *and* direction of the final segment.
4. You are standing 8.0 m from the base of a building and want to throw an egg at (uh, that is) to a “friend” in an upper level window. You throw the egg with a velocity of 16 m/s, 60° above the horizontal. It is right on target!
  - a) [5 pts] Draw a sketch showing the position and velocity of the egg at the beginning and the end of the interval of interest and your chosen coordinate system.
  - b) [8 pts] How long a time is the egg in the air?
  - c) [8 pts] How high above your level is your “friend”?
  - d) [4 pts] When the egg hits (uh, that is) *gets to* your “friend,” is it on the way up or on the way down? Explain!