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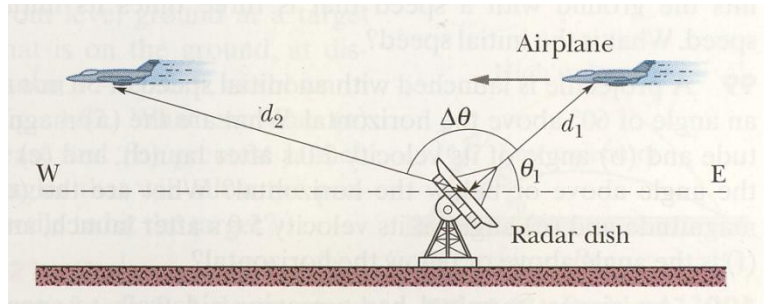
Name: _____

Physics 2A
Winter 2010
Exam 1

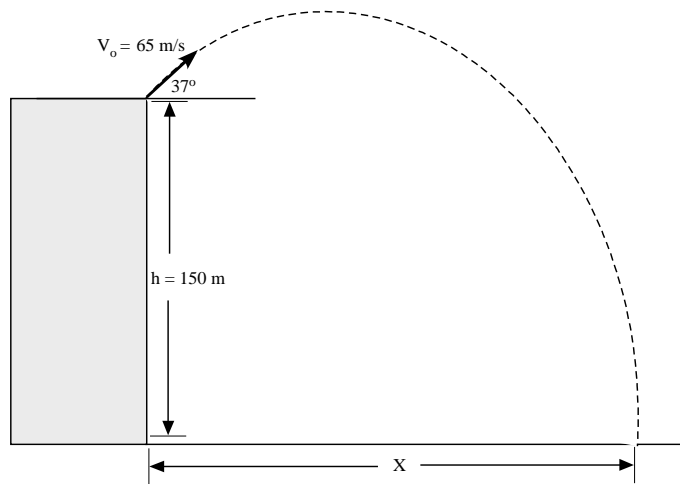
**MAKE SURE TO SHOW ALL WORK IN COMPLETE DETAIL. NO CREDIT WILL BE
GIVEN IF NO WORK IS SHOWN. EXPRESS ALL ANSWERS IN SI UNITS.**

1. At a construction site a pipe wrench fell from rest and struck the ground with a speed of 30 m/s. (10 pts)
 - a) Calculate the height it was dropped from.
 - b) Calculate how long it was falling.
 - c) Draw the graph of a vs t , v vs. t , and y vs. t .

2. In the figure below, a radar station detects an airplane approaching directly from the east. At first observation, the plane is at $d_1 = 370$ m from the station and at $\theta_1 = 40^\circ$ above the horizontal. The airplane is tracked through an angular change $\Delta\theta = 130^\circ$; its distance is then $d_2 = 780$ m. (10 pts)
- Sketch the displacement vector of the plane in the figure below.
 - Find the displacement of the plane during this time in unit-vector notation.
 - Calculate the magnitude and direction of the displacement vector.



3. A projectile is thrown from the edge of a building with an initial speed of 65.0 m/s at an angle of 37° with the horizontal. The height of the building is 150 m . See figure below. (10 pts)



- Calculate the time for the projectile to strike the ground.
- Calculate the range x of the projectile.

4. A clock has a second hand of length 20 cm. From the 12 P.M mark to the 9 P.M mark, for the tip of the second hand, :
- a) Calculate the displacement vector in unit-vector notation.
 - b) Calculate the average velocity vector in unit-vector notation.
 - c) Calculate the period of rotation.
 - d) Calculate the speed.
 - e) Calculate the instantaneous acceleration vector in unit-vector notation as it passes through the 6 P.M mark.
 - f) Calculate the average acceleration vector in unit-vector notation.