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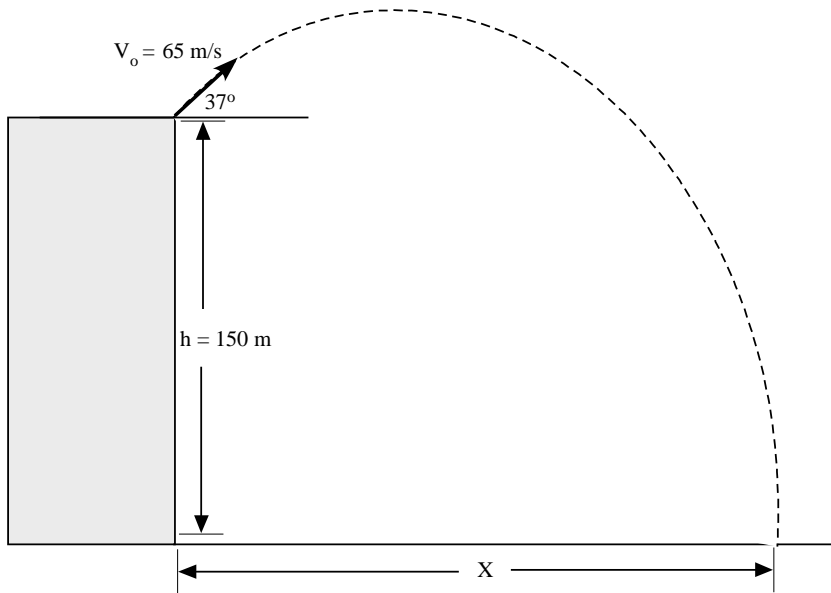
Name: _____

Physics 50
Winter 2011
Exam 2

**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. A jet is flying at 600 mi/h in a direction of 45° North of West. 2.5 minutes later it is flying at 450 mi/h in a direction of 30° North of East. (10 pts)
 - a) Sketch a vector diagram labeling \mathbf{V}_i , \mathbf{V}_f , and $\Delta\mathbf{V}$.
 - b) Calculate the average velocity vector in unit-vector notation.
 - c) Calculate the magnitude and direction of \mathbf{a}_{ave} .

2. 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. (15 pts)



- Calculate the time for the projectile to strike the ground.
- Calculate the range X of the projectile.
- Calculate the speed of projectile when it strikes the ground.

3. A cannon is placed at the bottom of a cliff 85 m high. If the cannon is fired straight upward, the cannonball just reaches the top of the cliff. (10 pts)
- a) Calculate the initial speed of the cannonball.
 - b) Suppose a second cannon is placed at the top of the cliff and fired horizontally with the same initial speed as part (a). Prove numerically that the range of this cannon is the same as the maximum range of the cannon from the base of the cliff.

4. You drive a car 1200 m due south for 20 min, then 1500 m at 30° west of south for 30 min, and finally 1050 m at 50° north of west for 40 min. (15 pts)
- Sketch the three displacement vectors and the resultant displacement vector on an x-y coordinate system.
 - Calculate the resultant displacement vector in unit-vector notation for the entire trip.
 - Calculate the magnitude and direction of the resultant displacement vector.
 - Calculate the average speed of the car for the entire trip.
 - Calculate the average velocity in unit-vector notation of the car for the entire trip.