TEST # 1. PHYS 203. Chapters 2-4. FALL 2002. 10/03/02

NAME:

1. Kinematics in 1D (30 points).

You are on the roof of the physics building, 46.0 m above the ground (see figure). Your physics professor, who is 1.80 m tall, is walking alongside the building at a constant speed of 1.20 m/s. If you wish to drop an egg on your professor's head, where should the professor be when you release the egg? (The egg is in free fall).

2. Kinematics in 2D. Projectile motion. (30 points)

A projectile is thrown with an initial speed v_0=25.0 m/2 at an initial angle with the horizontal $\alpha_0 = 45.0^o$.

(a) Find the time T when the projectile is at its maximum height.

(b) Find the position (x,y) at the maximum height.

(c) At time T, find the components of the acceleration vector and the velocity vector.

(d) Sketch the trajectory of the projectile. On your sketch, label the position of the projectile at time T, draw the velocity vector, and draw the components of the acceleration vector.

3. Newton's laws of motion. (30 points)

Two blocks connected by a cord passing over a small, frictionless pulley rest on frictionless planes. See the figure.

(a) What is the acceleration of the blocks?

(b) Which way will the system move when the blocks are released from rest ?

(c) What is the tension of the cord?

4. Newton's Third Law. (10 points)

An orange sits on a table in equilibrium.

(a) What forces act on the orange?

(b) What is the reaction force to each of the forces acting on the orange?

(c) What are the action-reaction pairs?