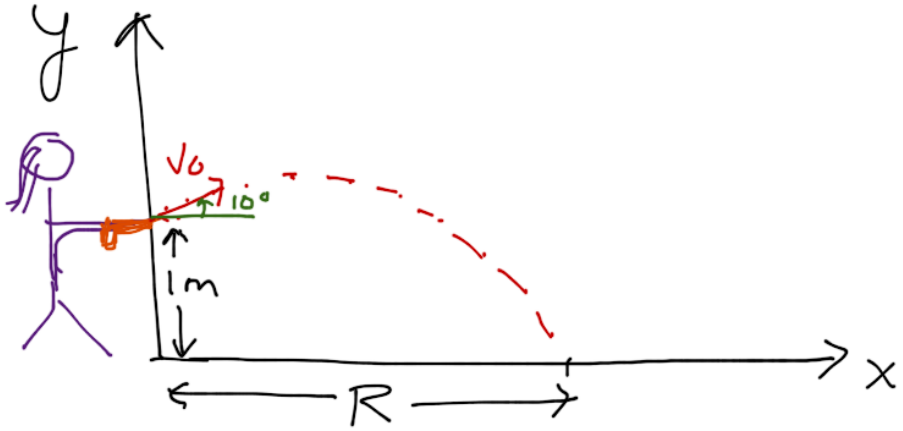
Physics 215 Fall 2019
HW for Week 3.

Please write out the full solutions to these questions on paper and turn them in to your TA at the beginning of recitation on Friday.

Textbook problems: OpenStax University Physics
Ch 2. 26, 36,77,88
Ch 4. 24,34,38,40,48

In order to win priority registration at Greendale Community College, Britta must win a paintball competition. During one particularly intense battle, Britta aims at a member of the Glee Club and fires a paintball in his direction. Brita's arm holding the paintball gun is 1 m off the ground, and the paintball leaves the paintball gun at an angle of 10 degrees above horizontal, with a speed of 20 m/s. The bullet misses the Glee club member, and lands a distance R away from Britta's feet, as shown in the Figure below. Assume that the x- and y-axes are in the directions shown in the figure, and that the magnitude of acceleration due to gravity is 10 m/s^2.



a. What are the initial (t=0) components of the velocity v_{0x}, and v_{0y} of the paintball?
b. Write down equations showing how velocity components v_x, v_y change with time t.
c. Write down equations showing how the x- and y-coordinates of the paintball change with time t.
d. Calculate the time at which the paintball hits the ground.
e. Calculate the distance R from Britta's feet where the paintball hits the ground.
f. Calculate the speed at which the paintball is traveling just before it hits the ground, and also the angle its velocity makes with the downward vertical.