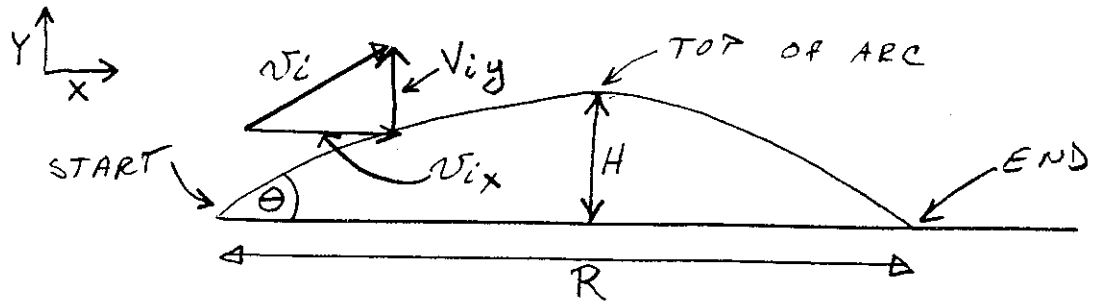
Iona Physics Experiment

Lab: To Measure The Speed of a Softball

Theory:

Neglecting friction, but considering gravity, the path of a projectile, fired at an initial velocity v_o can be determined from the following considerations:



Considering the *first half* of the trip (from the bat to the top of the arc:

Y motion: $V_{fy} = 0 = V_{iy} - g(t/2)$

Vi = initial velocity
Vf = final velocity
t = total trip time

This yields $V_{iy} = .5\ g\ t$

X motion: $V_{ix} = V_{fx} = V_x = R/t$

R = horizontal range

Therefore the speed of the ball is found to be

$$v = (V_{ix}^2 + V_{iy}^2)^{.5}$$

and $\text{Theta} = \tan^{-1} (V_{iy}/ V_{ix})$

Procedure:
As each student hits, others play the field, and still others measure and record R and T. When measurements have been recorded, we will return to the lab to complete the calculations.

Data: (Hit Ball)
(Record data of at least 5 students including yourself)

Name	R (meters)	t (sec)	V (m/s)	Theta

A few students will try to THROW the ball as far as possible:

Data (Thrown softball)

Name	R (meters)	t (sec)	V (m/s)	Theta

uestions:

1. What would be the effect of air resistance on the measurements made above? (If air resistance were to be greater, how would it change the results we derived from this experiment?

2. What is the angle at which you should try to hit the ball to maximize the range?

3. If YOU had hit the ball with the same initial velocity as indicated on the chart and at the optimal angle indicated in question 2, how much farther would your softball have travelled?

4. Considering air resistance (friction) again: If a ball is thrown straight up and returns to its place of origin, does it take longer for the ball to ascend or to decend?