Name_____ Date _____ Period _____

Answer all questions for this lab on a separate sheet of paper.

PHYSICS LAB: The Softball Throw

Purpose

To discover how fast you can throw a softball by measuring range and time.

Materials

- *one* each—softball, stopwatch, paper, pencil, and calculator

Procedure

1. Take all of your materials out to the football field (or a large open area with premeasured distances).
2. Select a thrower, a timer, and a marker from each group.
3. All throwers should toss the ball around to loosen up the arm muscles.
4. Set up a data table to record the distance the ball flies in the air and the time of flight.
5. The thrower should stand at the goal line. The marker should move downfield and stand at a place where she feels the ball might land.
6. Measure the time and use the lines on the field to estimate the range for two throws.
7. As soon as your group has estimated the range, give the softball to another group and *leave the area!*

Calculations

1. Determine the initial values of v_x for each throw. **Hint:** Since

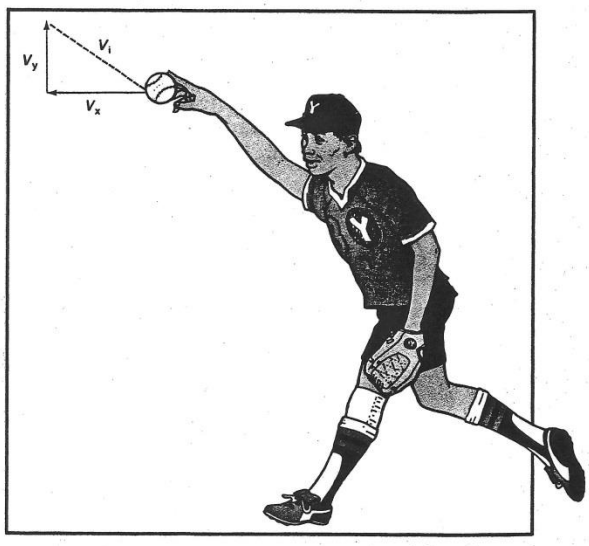
   $R = v_x t$, then $v_x = \frac{R}{t}$.

   Sample calculation:

   $R = 60$ m, $t = 4.0$ s; $v_x = \frac{60 \text{ m}}{4.0 \text{ s}} = 15$ m/s

2. Determine the initial value of v_y. **Hint:** The ball spent an equal time moving up and down. Divide the time by 2 and then multiply by 9.8 m/s^2 to find the value of v_y.
   Sample calculation: $t = 4.0$ s indicates that the ball was at the top in 2.0 s. The initial value of v_y:

   $$v_y = 9.8 \text{ m/s}^2 \times 2.0 \text{ s} = 19.6 \text{ m/s}$$



3. Draw a triangle as shown here. Record *your values* of v_x and v_y.
4. Use the Pythagorean Theorem to find the value of v_i.

Observations and Data

1. Did each person throw at about the same range?
2. Did each person throw at about the same speed, v_i?

Analysis

1. Should the thrower try to throw with a larger v_x or v_y? Explain.

Applications

1. Why might a kickoff in a football game be made at a different angle than a punt?