Projectile Motion Lab Report

Physics

This is an individual assignment – you can use your notes and discuss with others as needed, but the report you turn in should reflect your own work, understanding, and thinking. You should also test your predictions with one other student (choose this partner carefully!) You may hand-write or type this assignment; however you complete the assignment, please submit it through Showbie.

1. Using the LoggerPro file posted to the class website, calculate the initial velocity vector of the launcher (include magnitude and direction).
    a. Use the data to find the initial x- and y-components of the launcher's velocity.
    b. Find the resultant vector using the method discussed in class.
2. You can assume that the magnitude of the initial velocity of the launcher will be the same – no matter what the angle. Therefore, you can use this initial velocity to make predictions. **Before you move to step three, please verify your calculations for step 1**! (It is important that we all use the same initial velocity for accuracy.)
3. Use the Big Four to make predictions for the following parameters: the launcher will be fixed on a lab table such that the ball is at a height of 1.124 meters above the ground. The launcher will be set at an 18^{o} angle. Show all of your work in detail for full credit.
    a. How long will the ball take to hit the ground?
    b. How far will the ball go (horizontally) from the launcher when it first lands on the floor?
    c. How far away should a 0.185 meter tall container be placed in order to catch the ball as it lands?
    d. How tall should a hoop that is 0.5 meters away from the launcher be in order for the ball to go through the hoop?
4. Test your predictions by setting up the launcher, hoop, and container according to your calculations. If your test is correct, you and your partner will both receive full credit on the lab report without needing to submit a formal written report (just indicate on Showbie that you correctly predicted the trajectory of the ball).
5. If your predictions are incorrect, find the correct positions for the hoop and container through trial-and-error. Explain, in a few physics-oriented sentences, why you think your calculations did not lead you to the correct solution.