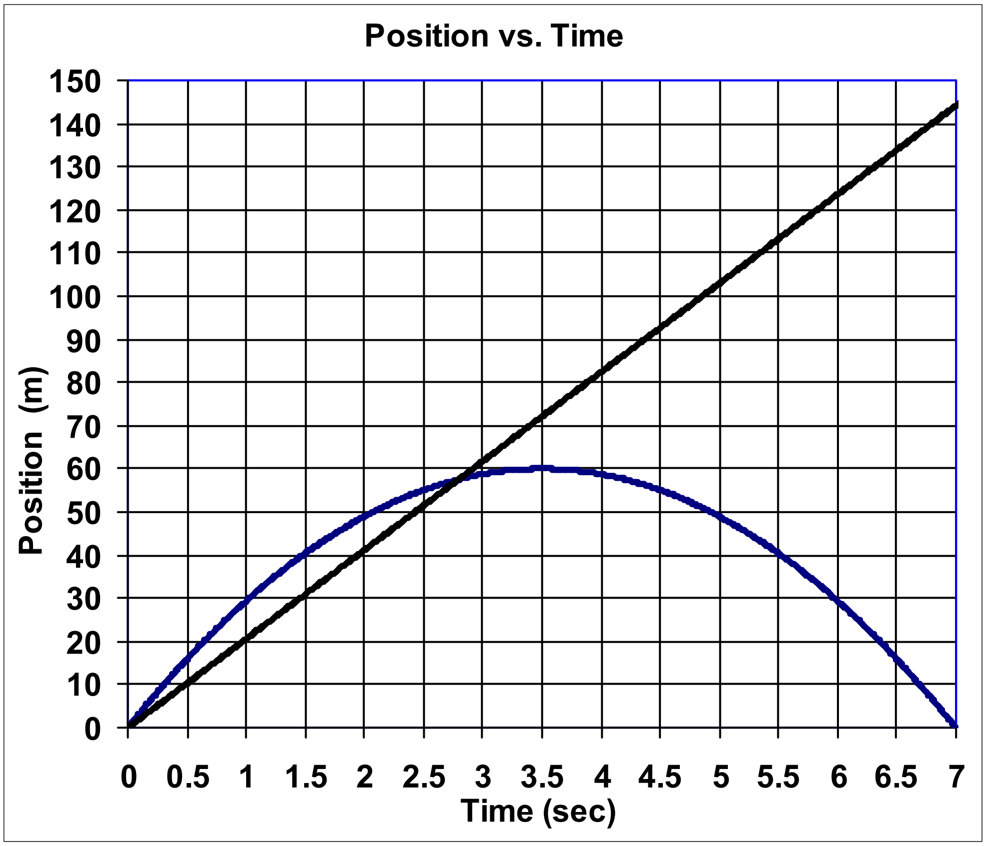
A-Day: Due Tues., Oct 13
B-Day: Due Wed., Oct 14

PreAP Two Dimensions 7

1. Complete the force table lab. Use the numbers from the previous homework. There is a help page on the website.
2. Remake your quiz VERY SOON!

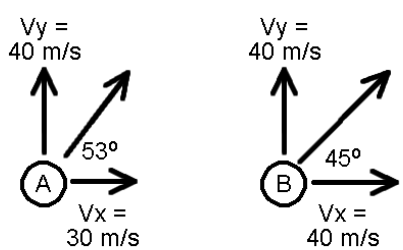
3. The slope of a position vs. time graph gives you an object's change of position over time or the _______________ of the object.

4. The slope of a velocity vs. time graph gives you an object's change of velocity over time or the _____________ of the object.

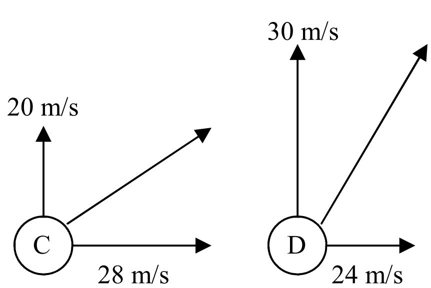


5. An object is shot from the ground to the ground. The position vs. time graphs of this is shown at the left.
   A. Which one is the x-direction?
   B. Why?
   C. Calculate the x-direction velocity of the object.
   D. How high did the object go?
   E. How long did it take for the object to reach the top point?

   F. Optional Challenge: What is the object's initial velocity? (*Magnitude and direction*).



6. Ball A or Ball B?
   A. Which one is in the air for the most time?
   B. Which one has the greatest range?
   C. Which one has the greatest velocity (total velocity)?



7. Ball C or Ball D?
   A. Which one is in the air for the most time?
   B. Which one has the greatest range?
   C. Which one has the greatest initial velocity?

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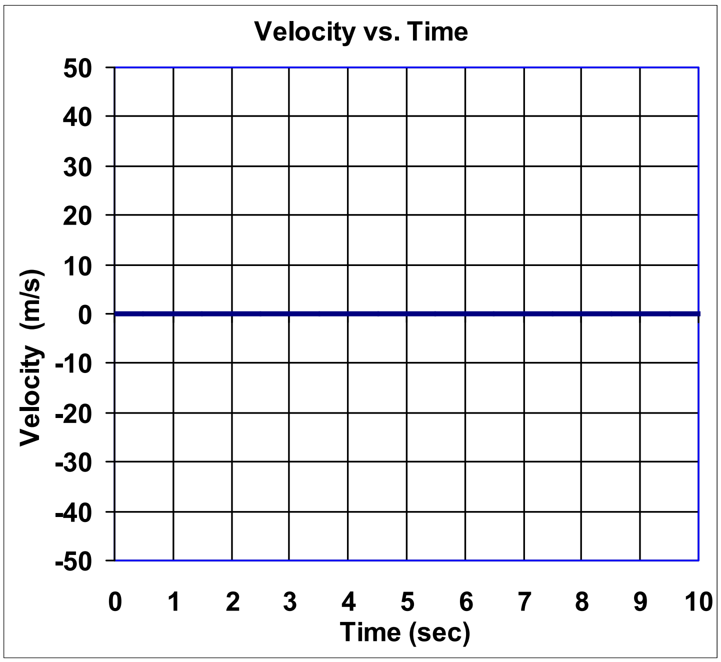
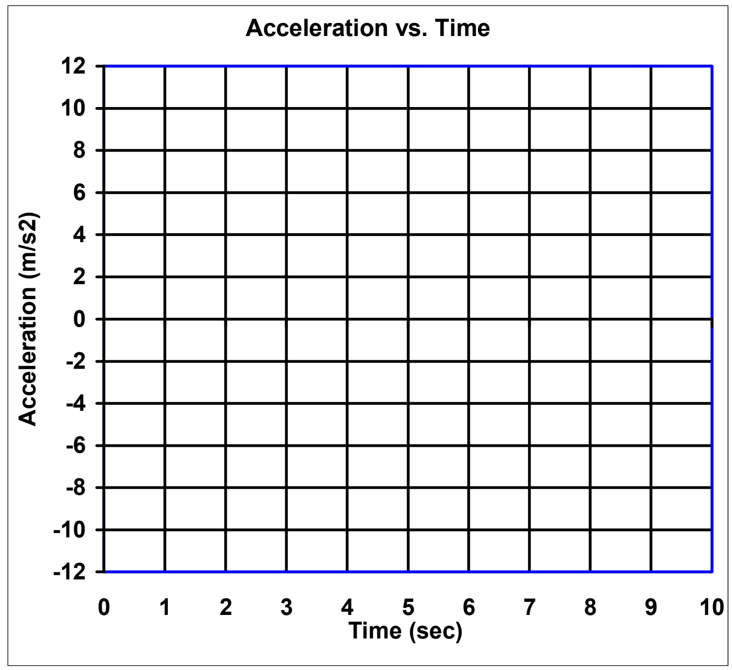
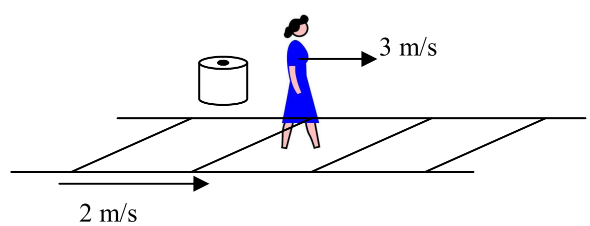
8. A ball is shot from a potato cannon down toward the ground. The ball hits the ground and bounces back up at 60° and 45 m/s. The ball bounces from the ground and lands back on the ground. Graph the object's motion on the velocity and acceleration graphs below. Use a dashed line to show the x-direction and a solid line for the y-direction. [Hints: You can find its initial and final velocities and how long it is in the air. Make sure your line crosses the x-axis (0 m/s) at the exact right time AND that your graph ends at the right time.)





From the "Relative Motion Notes" -

9. A moving walkway at the airport has a velocity of 2 m/s to the right. A person walks at a steady pace of 3 m/s.



A. If the person is walking to the right, what is their velocity relative to the walkway?

B. What is their velocity relative to the ground?

C. How long would it take them to travel to the food court, 100 m away?

D. How long would it take them to walk back if they have to walk on the same walkway?

E. How long would it take them to walk to the food court and back without using the walkway?

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10. A person can swim 4 m/s. The river has a current flowing 6 m/s directly east.
    A. What will be the direction and velocity of the person if they aim directly across the river (north)?

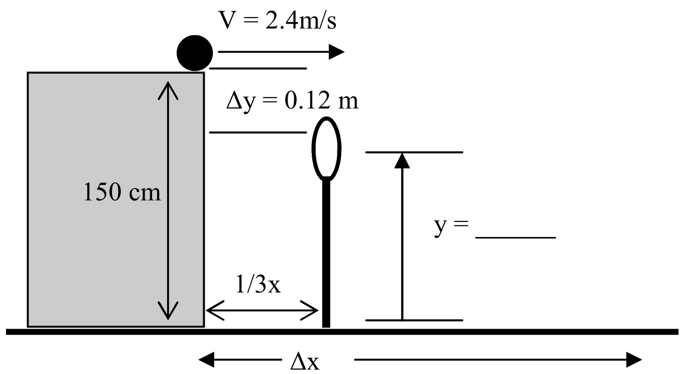
    B. If the person swims at constant speed, how long does it take them to swim across the 40 m wide river?

    C. If the river's current increases (gets faster), will the person take more or less time to cross the river?

11. Use the diagram at the right for the following:
    A. When you calculate Δy, this tells you what?

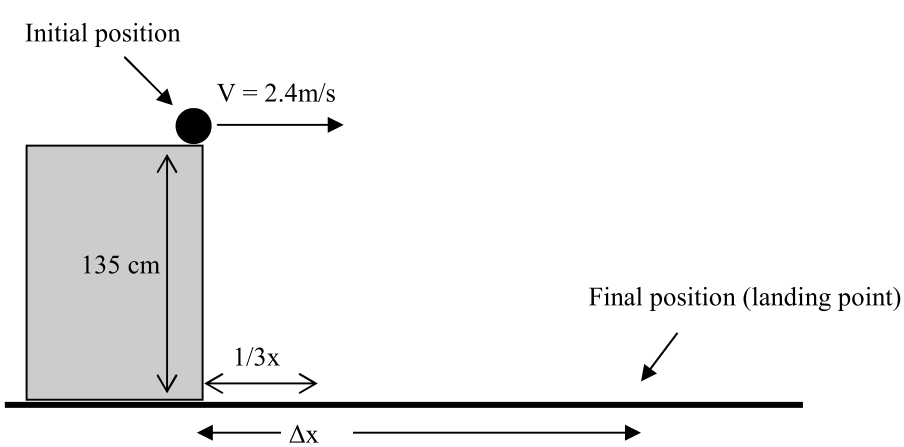
    B. A person calculates Δy as 0.12 m. What is the position of the hoop (what is y)?

    In this case it would have been easier in this case to substitute $\Delta y = y_f - y_i$. Then you would have solved for the final position of the hoop instead of Δy.



The following questions will teach you how to calculate your hoop positions for the "Shoot the Hoops" lab. Come in for help if you don't get this. But please fight thru it first.

12. A small metal ball is launched from a projectile launcher from the top of a 135 cm tall table. The ball is launched 2.4 m/s horizontally and will pass thru 2 hoops.
    A. Calculate the range of the ball (find Δx).



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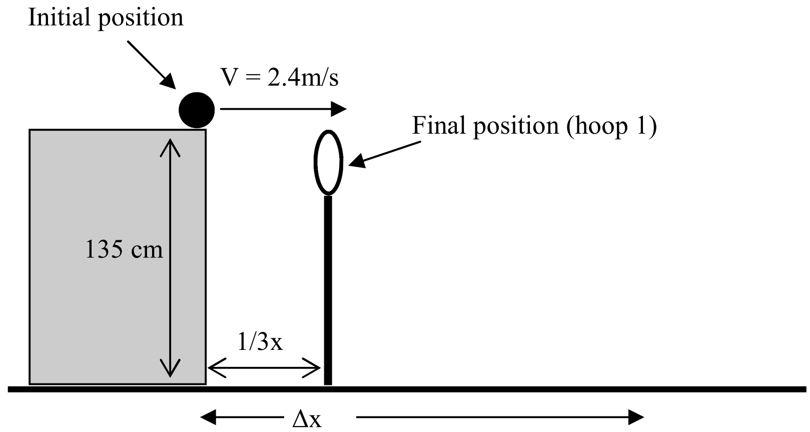
Hoop 1 is on the projectile's path at 1/3 of Δx (the range you just found).

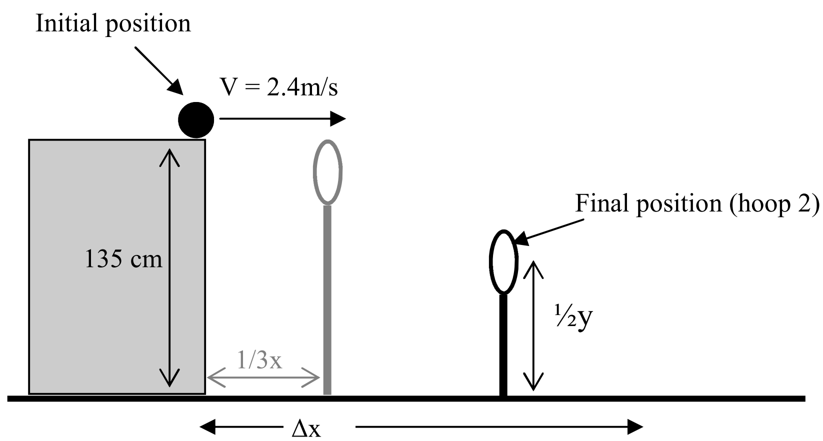
B. Calculate the x and y positions of this hoop. (*Your initial position is still at the top of the table, but your final position is now at hoop 1. So you will have to change your variable list and recalculate. You may also want to learn from question 11, so that you are solving for the actual position of the hoop, not Δy.*)



C. Calculate the angle of hoop 1 by finding Vx and Vy at the hoop.

Hoop 2 is placed on the projectile's path so that it is 1/2 of y (the table height).

D. Calculate position and angle of hoop 2. Your initial position is still at the top of the table. Your final position is now at hoop 2. You will have to change your variable list again.



This is how you will calculate your hoops for the "Shoot the Hoops" lab. You will be graded on how accurately you shoot thru your hoops. If you hit the hoops, you will lose points. So measure and calculate correctly. I can double check your numbers IF you have them calculate already.

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