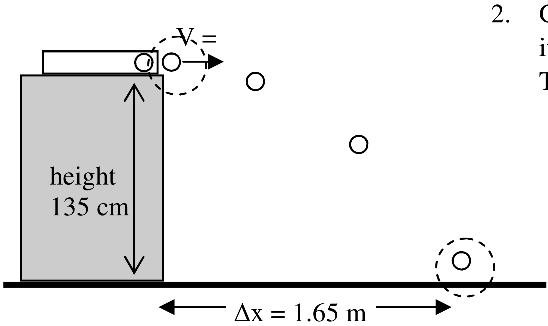
Due Fri., Oct 7

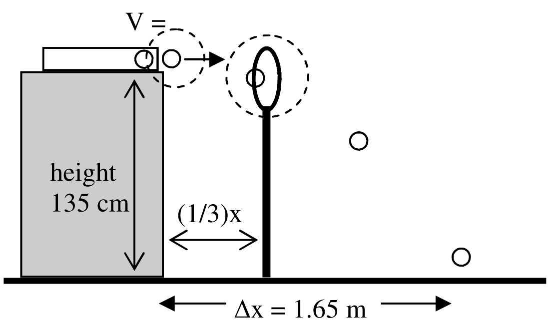
2011 PreAP Two Dimensions 16

1. Four projectile are launched from the ground with the same initial velocity. Their angles of fire are: 30°; 45°; 60°; 80°.
   - A. Which one has the most hang time (greatest t)?
   - B. Which has the greatest Vx?
   - C. Put them in order from greatest range to least range. If they are the same, say so.

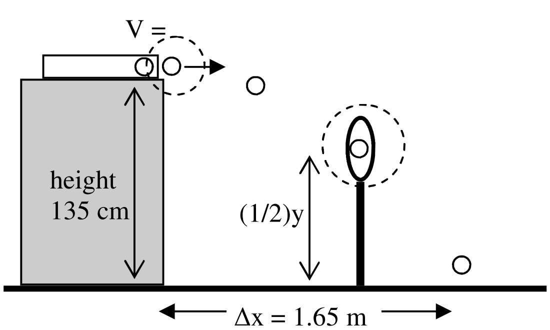
Let's practice for the hoops lab. Again, the example from the in class practice are on the last page. WORK IN METERS!



2. Given the information at the left, calculate the initial velocity of the ball when it leaves the projectile launcher, assuming the ball is horizontally launched. The dotted circles show your initial and final positions for this part.



3. Hoop 1 is placed at (1/3)x, where x is your original range. You need to find x and y for the hoop. Notice that one of the circles has been moved and that your initial conditions are the same as before.
   - A. What is (1/3)x? (*Put this in your x-direction information.)*
   - B. * Solve for the time to Hoop 1.
   - C. Solve for Δy (*which is NOT the vertical position of the hoop*).
   - D. Since $\Delta y = y_f - y_i$, solve for the vertical position of the hoop.
   - E. * So Hoop 1 is at what x and y position?

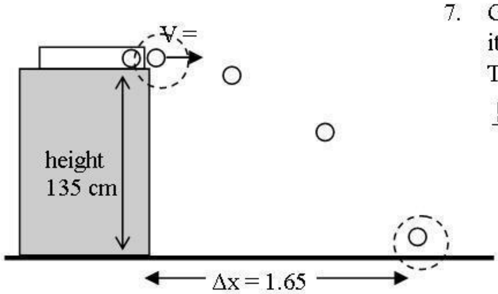


4. Hoop 2 is placed (1/2)y, where y is your original height of the launcher. You need to find the x and y positions for Hoop 2. Again, only the final circle has moved.
   - A. What is (1/2)y? (*Put this into your y-direction information*)
   - B. * Solve for the time to Hoop 2 (*realizing Δy is still negative*).
   - C. Solve for the x position of Hoop 2.
   - D. So, Hoop 2 is at what x and y position?

From the "Projectile Concepts" notes:

6. Four projectile are launched from the ground with the same initial velocity. Their angles of fire are: 30°; 45°; 60°; 80°.
   A. Which one has the most hang time (greatest t)? (y-dir quest, so): 80°
   B. Which has the greatest Vx? 30°
   C. Put them in order from greatest range to least range. If they are the same, say so.
   45°, [same: 30°, 60°], 80° -2w

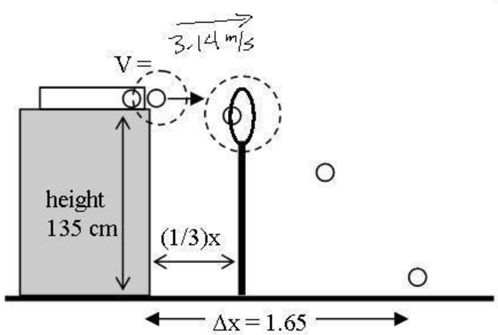
Let's practice for the hoops lab. Again, the example from the in class practice are on the last page.



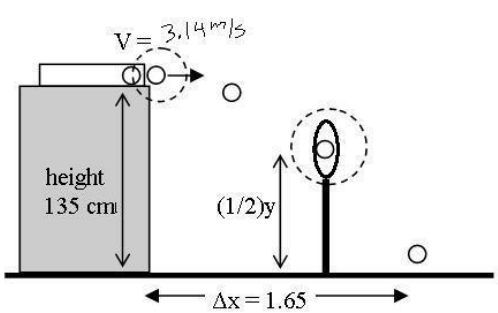
7. Given the information at the left, calculate the initial velocity of the ball when it leaves the projectile launcher, assuming the ball is horizontally launched. The dotted circles show your initial and final positions for this part.

y-dir
$a = -g$
$v_i = 0$ m/s
$\Delta y = -1.35$ m
$\Delta y = v_i t + \frac{1}{2} a t^2$
$-1.35 = -4.9t^2$
$t = .525$ sec -2w

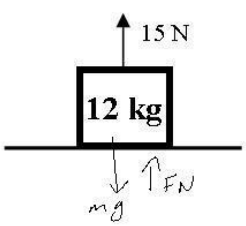
x-dir
$S = \frac{D}{T}$
$= \frac{1.65}{.525}$
$= 3.14$ m/s -2w
(mmm, pie)



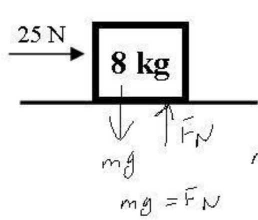
8. Hoop 1 is placed at (1/3)x, where x is your original range. You need to find x and y for the hoop. Notice that one of the circles has been moved and that your initial conditions are the same as before.
   A. What is (1/3)x? .55 m *(Put this in your x-direction information.)*
   B. * Solve for the time to Hoop 1.
   $S = \frac{D}{T}$ $T = \frac{.55}{3.14} = .175$ sec -2w
   C. Solve for Δy (*which is NOT the vertical position of the hoop*).
   $v_i = 0$ m/s
   $t = .175$ sec
   $a = -g$
   $\Delta y = v_i t - 4.9(.175)^2$
   $\Delta y = -.15$ m -2w
   D. Since $\Delta y = y_f - y_i$, solve for the vertical position of the hoop.
   $-.15 = y_f - 1.35$ $y_f = -.15 + 1.35 = 1.2$ m -1w
   E. * So Hoop 1 is at what x and y position?
   $x = .55$ m $y = 1.2$ m -2w



9. Hoop 2 is placed (1/2)y, where y is your original height of the launcher. You need to find the x and y positions for Hoop 2. Again, only the final circle has moved.
   A. What is (1/2)y? .675 m *(Put this into your y-direction information)*
   B. * Solve for the time to Hoop 2.
   $-.675 = \cancel{v_i t} - 4.9t^2$
   $t^2 = .138$ -2w
   $t = .371$ sec
   C. Solve for the x position of Hoop 2. -2w
   $S = \frac{D}{T}$ $D = ST = 3.14(.371) = 1.165$ m
   D. So, Hoop 2 is at what x and y position?
   $x = 1.165$ m $y = .675$ m -2w



10. Calculate the normal force acting on the mass.
$mg = 12(9.8)$
$= 117.6$ N
$F_N = 117.6 - 15 =$
102.6 N
-1w



$mg = F_N$

11. A. Is the normal force and x or y direction force?
    B. Calculate the normal force on the mass.
$mg = 8(9.8) = 78.4$ N
$F_N = 78.4$ N -2w

