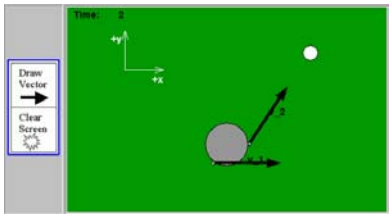
Worksheet for Exploration 3.3: Acceleration of a Golf Ball That Rims the Hole



A putted golf ball "rims" the hole as shown in the animation **(position is given in centimeters and time is given in seconds)**. Velocity vectors for the ball at the instant just before it hits the hole and the instant just after it hits the hole are shown. Restart. Note that the ball's speed does not change upon hitting the edge of the hole; this would not occur for an actual golf ball that rims the hole.

Suppose we want to find the average acceleration of the golf ball at some instant when it is in contact with the hole.

a. Draw the change-in-velocity vector using the velocity vectors shown. Click "Draw Vector" to add a vector to the animation and click "Clear Screen" to erase all drawn vectors.

b. What is the magnitude and direction of the change-in-velocity during this interval?

   i. Determine the magnitude by directly measuring with the simulation. You will need to use the pythagorian theorem to determine the magnitude. You will also need to record components.

$\Delta v_x =$
$\Delta v_y =$
$\lvert \Delta \mathbf{v} \rvert =$
θ_v

c. What is the average acceleration during this interval?

   ii. Use your data from part b above to determine the acceleration vector.

d. For the animation shown, at what instant do you think the instantaneous acceleration will equal the average acceleration of the golf ball during the time interval from 0.9 s to 1.2 s?

e. Click here to view the acceleration vector. If your change-in-velocity vector is still drawn on the screen, then you can stop the animation at the point where the acceleration vector and change-in-velocity vector match up. Did this occur at the instant you predicted?