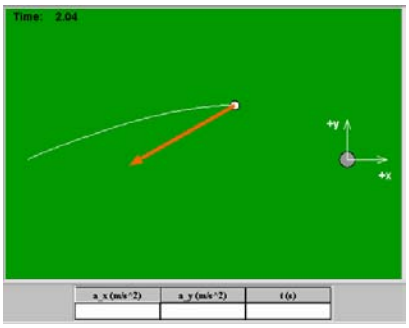
Worksheet for Exploration 4.6: Putted Golf Ball Breaks Toward the Hole



A putted golf ball rolls toward the hole on a green. The animation shows a top view of the ball on the green. Restart. The acceleration vector (orange) of the ball is shown on the animation, and the components of the ball's acceleration are displayed in the data table.

The net force on the golf ball is in the same direction as the acceleration of the golf ball, according to Newton's second law. This means that if you know the mass of the golf ball and the acceleration of the golf ball, you can calculate the net force on the golf ball.

a. Is the net force on the golf ball in the animation constant during the interval from t = 0 to t = 4.8 s?

b. If not, does its magnitude and/or direction change?

c. If the mass of a golf ball is 0.046 kg, what is the net force on the golf ball at t = 1.0 s?

i. Use the components of acceleration to find the magnitude of the acceleration at t=1.0s.

ii. Use the components to find the angle of the acceleration vector. Note you will need to be careful about the answer you may receive from your calculator. Angles should be measured from the direction of the positive x axis.

a. Is the answer between 0-90^{o}
b. Between 90-180^{o}
c. Between 180-270^{o}
d. Between 270-360^{o}

iii. If you are having trouble getting your calculator to be as smart as you are, draw a sketch of the situation. Draw the axes you are given. Then draw the acceleration vector, but continue a dashed line both ways along the acceleration vector (forward and back), also note the direction of the arrow. Examine the angles this line makes with the positive x axis. This should help you determine why your calculator does not give the correct answer.

d. For practice, calculate the net force on the golf ball at t = 2.0 s, t = 3.0 s, and t = 4.0 s as well.

i. 2.0s

$F_{net,\ 2.0s}$=_____ Angle=_____

ii. 3.0s.

$F_{net,\ 3.0s}$=_____ Angle=_____

iii. 4.0s

$F_{net,\ 4.0s}$=_____ Angle=_____