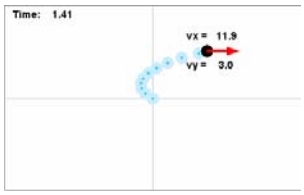
Worksheet for Exploration 4.4: Set the Force on a Hockey Puck



A 250-gram hockey puck is acted upon by a single force. It is free to slide on the ice **(position is given in meters and time is given in seconds)** in any direction. You can set the force vector by changing its magnitude (0 N < *F* < 10 N) and direction. The force vector is shown in the animation as a red arrow. You also can set the initial velocity components (-15 m/s < v < 15 m/s). Restart.

a. When the initial velocity is zero, in what direction does the ball travel for a given force?

i. What is the direction of the force you chose?

ii. What is the direction of the acceleration?

iii. You should be able to predict the magnitude of the acceleration. Do this but also confirm by making several measurements of the position.

iv. Are the acceleration and force vectors constant?

b. When the initial velocity is not zero, in what direction does the ball travel for a given force?
Hint: The best way to do this is to pick a nonzero v_{0x} or v_{0y}, not both. Also turn on the ghosts.

i. Is the direction of the velocity vector constant? If yes, which way. If no, describe how it is changing.

c. Try F = 5 N, θ = 270°, v_{0x} = 7 m/s, and v_{0y} = 15 m/s. Does this motion look familiar? Turn on the ghosts to help with the answer.

i. What type of motion or force does this remind you of?

ii. With the ghost features turned on, measure several consecutive x,y positions and discuss how this relates to each component of velocity and acceleration (for these settings).