Worksheet for Exploration 4.2: Change the Two Forces Applied

Time: 2.7 Forces

vx (m/s)	vy (m/s)	ax (m/s^2)	ay (m/s^2)
-21.95	+0.15	-117.53	+2.19

Drag either of the crosshair cursors or the ball **(position is given in centimeters and time is given in seconds)**. The cursors each exert a constant force on the black ball (either attraction or repulsion) if they are **within 10 cm** of the ball. When the ball hits a wall, the wall exerts a force on the ball causing it to recoil. The green and red arrows display the forces due to each cursor, and the blue arrow represents the net force. Restart.

For attraction and repulsion, drag the black ball around to see the net force. When you get the ball in a "good" spot, click the "play" button to see the effect of the forces on the ball. Briefly explain how and why the ball moves according to the forces applied.

a. With the crosshairs in their default positions, set attraction, place the ball at a non-zero position along the x axis so that each crosshair exerts a force and then press play.
    i. What is the y component of net force at all times?

    ii. Is the x component of net force ever zero, if so, where?

    iii. Is the x component of net force constant? If not discuss why it is changing since the force due to each crosshair is constant.

b. Reset the simulation (refresh or reload the page) and set to attraction, and place the ball at x=0 and y=-10cm . Then press play.
   i. What is the x component of net force for all times throughout this simulation?

   ii. Is the y component of net force constant throughout?

   iii. Is the y component of net force constant for any range of positions? If so can you determine what the net force is in this region? Do so!

   iv. Is the net force zero at any positions for this simulation? If so where? Does the ball move even while the net force is zero? Discuss.

c. Try to set up situations similar to a and b but for the repulsive force.