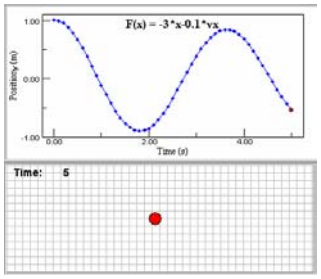
Worksheet for Exploration 5.5: Enter a Formula for the Force



This Exploration allows you to choose initial conditions and forces *with damping,* and then view how that force affects the red ball. You can right-click on the graph to make a copy at any time. If you check the "strip chart" mode box, the top graph will show data for a time interval that you set. Note that the animation will end when the position of the ball exceeds +/-100 m from the origin. Restart.

*Remember to use the proper syntax such as -10+0.5*t, -10+0.5*t*t, and -10+0.5*t^2. Revisit Exploration 1.3 to refresh your memory.*

For each of the following forces, first describe the force (magnitude and direction) and then predict the motion of the ball. How close were you? Don't forget to determine how the initial position and velocity affect the motion of the ball for each force.

a. $F_x(x, vx, t) = 1-0.05*vx$

i. Select initial position and velocity:

x_o=_____ v_o=_____

ii. Describe the motion (prediction)

iii. Does the ball continue moving?

iv. Does the ball continue accelerating?

v. Is the force on the ball ever zero, and is the ball stopped when the force is zero?

b. $F_x(x, vx, t) = 1-0.5*vx$

i. Select initial position and velocity:

x_o=_____ v_o=_____

ii. Describe the motion (prediction)

iii. Does the ball continue moving?

iv. Does the ball continue accelerating?

v. Is the force on the ball ever zero, and is the ball stopped when the force is zero?

c. $F_x(x, vx, t) = 1-vx$

i. Select initial position and velocity:

x_o=_____ v_o=_____

ii. Describe the motion (prediction)

iii. Does the ball continue moving?

iv. Does the ball continue accelerating?

v. Is the force on the ball ever zero, and is the ball stopped when the force is zero?

d. $F_x(x, vx, t) = -9.8-vx$

i. Select initial position and velocity:

x_o=_____ v_o=_____

ii. Describe the motion (prediction)

iii. Does the ball continue moving?

iv. Does the ball continue accelerating?

v. Is the force on the ball ever zero, and is the ball stopped when the force is zero?

e. $F_x(x, vx, t) = x-vx$

i. Select initial position and velocity:

x_o=_____ v_o=_____

ii. Describe the motion (prediction)

iii. Does the ball continue moving?

iv. Does the ball continue accelerating?

v. Is the force on the ball ever zero, and is the ball stopped when the force is zero?

f. $F_x(x, vx, t) = \cos(x)-vx$

i. Select initial position and velocity:

x_o=_____ v_o=_____

ii. Describe the motion (prediction)

iii. Does the ball continue moving?

iv. Does the ball continue accelerating?

v. Is the force on the ball ever zero, and is the ball stopped when the force is zero?

g. $F_x(x, vx, t) = \cos(t)-vx$

i. Select initial position and velocity:

x_o=_____ v_o=_____

ii. Describe the motion (prediction)

iii. Does the ball continue moving?

iv. Does the ball continue accelerating?

v. Is the force on the ball ever zero, and is the ball stopped when the force is zero?