Uniformly Accelerated Particle Model Deployment Activities

1. Motion of a freely falling object: Picket fence

Open the Logger Pro template "Photogate and picket fence."

Hit return or click "collect."

Hold the bottom edge of the picket fence just over the photogate and then drop the picket fence through the photogate.

Copy the time and position data into the table below and complete the analysis of the data.

bar	time (s)	position (m)	Δt (s)	Δx (m)	v	t_{mp}
1						
2						
3						
4						
5						
6						
7						
8						

Use Logger Pro to graph instantaneous velocity vs. time and to find the slope of the line.

What is the value of the acceleration of the falling picket fence? Include units!

Print the graph and keep it with this lab in your binder.

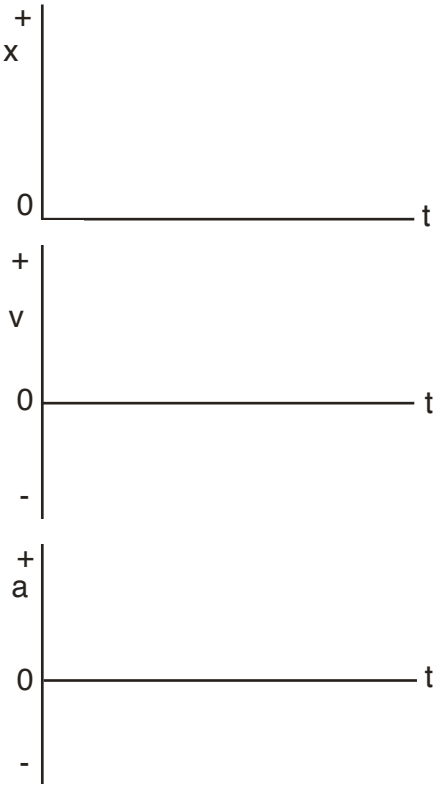
2. Motion of a freely falling object: Basketball

The motion detector is on the floor, wedged between two bricks to protect it.

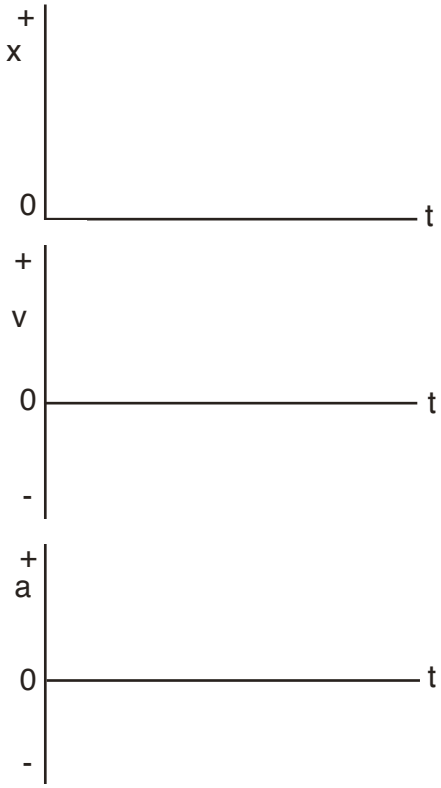
Practice throwing the ball straight up over the detector. Be careful to keep your hands out of the way.

Predict what the graphs will look like describing the up and down motion of the ball on the graph axes below.

Predictions



Observations



Open the Logger pro template "Basketball and motion detector."

Hit return or click "collect."

Once you get a good throw, record your observations on the right set of graph axes above.

Record the value of the acceleration of the basketball from the graph: _____
Include units!

Fill in the following table with algebraic signs of +, -, or zero.

	going up	at the top	coming down
position:			
velocity:			
acceleration:			

3. Motion of a fan cart: Away, then Back

a. Turn on the fan and observe the motion of the cart after an initial push without using the motion detector. Answer the following questions for the cart while <u>coasting</u>.

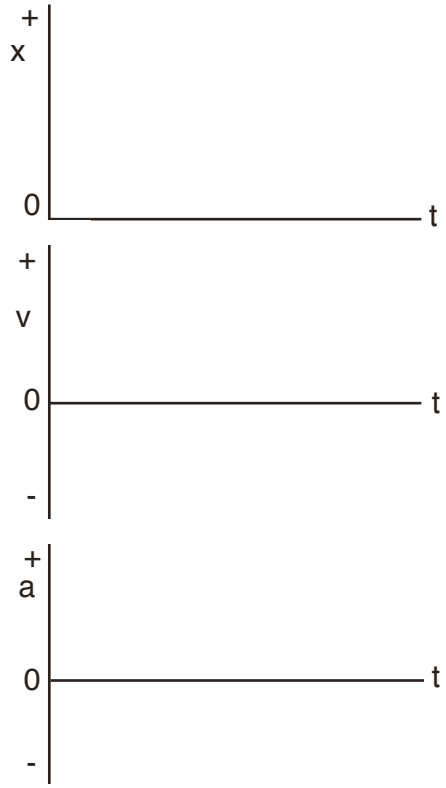
Give the cart an initial push to the right.
Stop it before it reaches the detector on the way back.

b. Draw a motion map including both velocity and acceleration vectors.

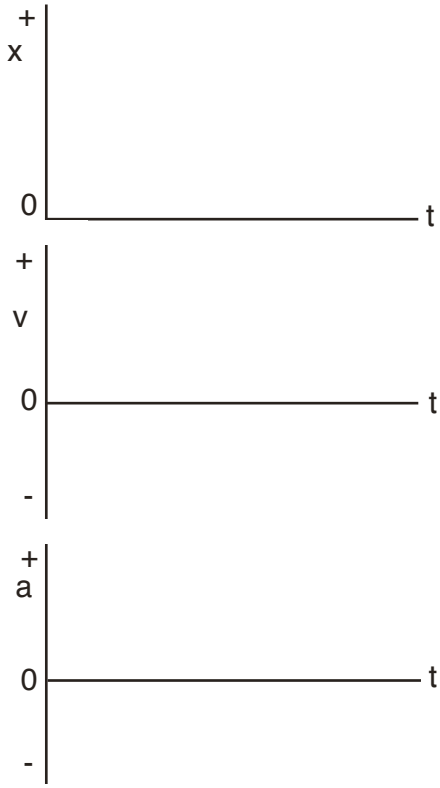
c. Is the velocity positive or negative?
Does the direction of the velocity change?

d. Is the acceleration positive or negative?
Does the direction of the acceleration change?

e. **Predictions:** Predict the graphs describing the motion.



f. **Observations:** Record the graphs as displayed by the motion detector.



g. Describe the changing slope of the position time graph.

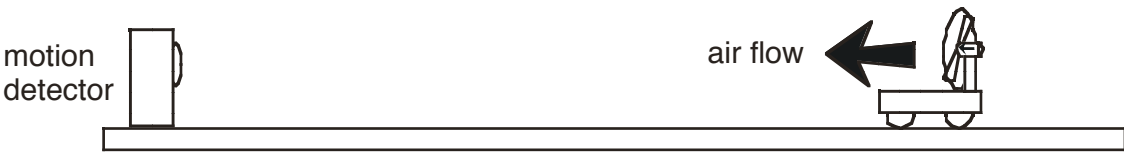
h. What does the position-time graph slope represent?

i. Describe the slope of the velocity-time graph.

j. What does the slope of the velocity-time graph represent?

4. Motion of a fan cart: Toward, then Away

a. Turn on the fan and observe the motion of the cart after an initial push without using the motion detector. Answer the following questions for the cart while <u>coasting</u>.



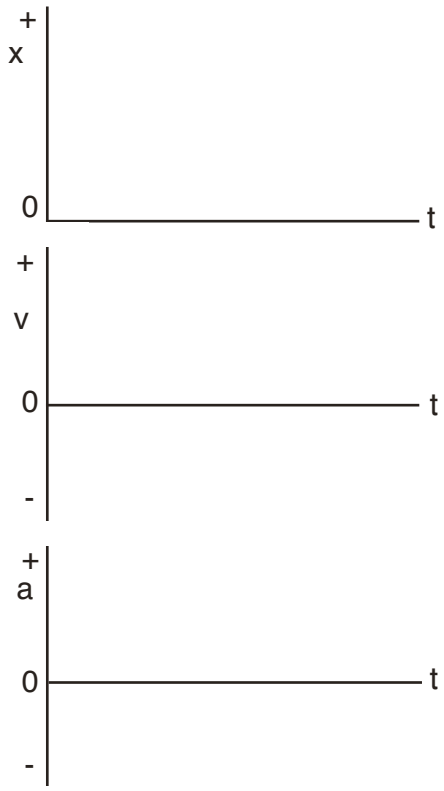
Give the cart an initial push to the left.
Stop it before it hits the end stop on the way back.

b. Draw a motion map including both velocity and acceleration vectors.

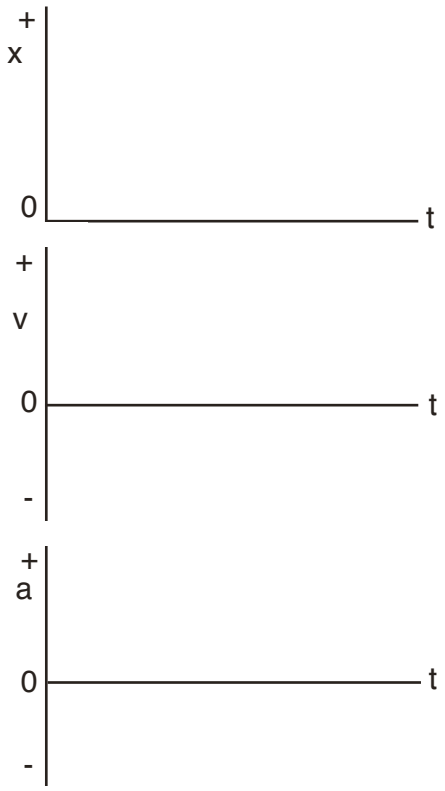
c. Is the velocity positive or negative?
Does the direction of the velocity change?

d. Is the acceleration positive or negative?
Does the direction of the acceleration change?

e. **Predictions:** Predict the graphs describing the motion.



f. **Observations:** Record the graphs as displayed by the motion detector.



g. Describe the changing slope of the position time graph.

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i. Describe the slope of the velocity-time graph.

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