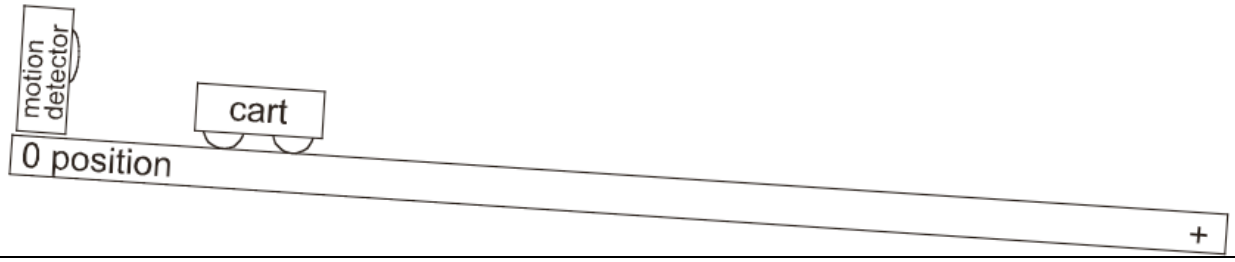
Uniformly Accelerated Particle Model

Lab Extension: Increasing and Decreasing Speed

1. Increasing speed in the positive direction

a. Without using the motion detector, observe the motion of the cart as it starts from rest and rolls down the incline.

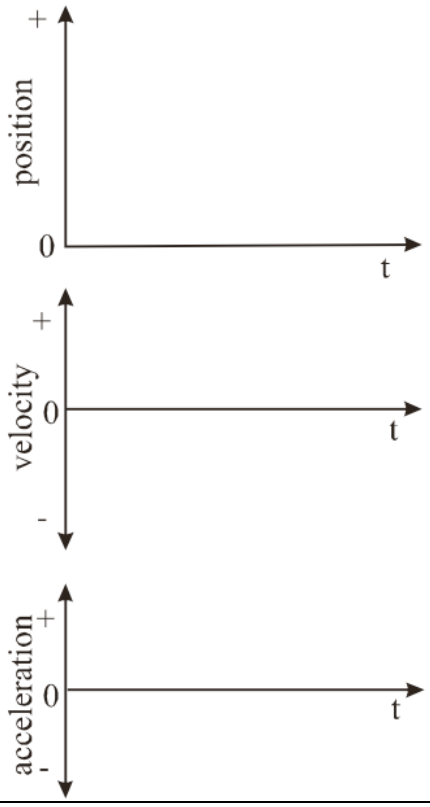


b. Draw a motion map. Include velocity and acceleration vectors.

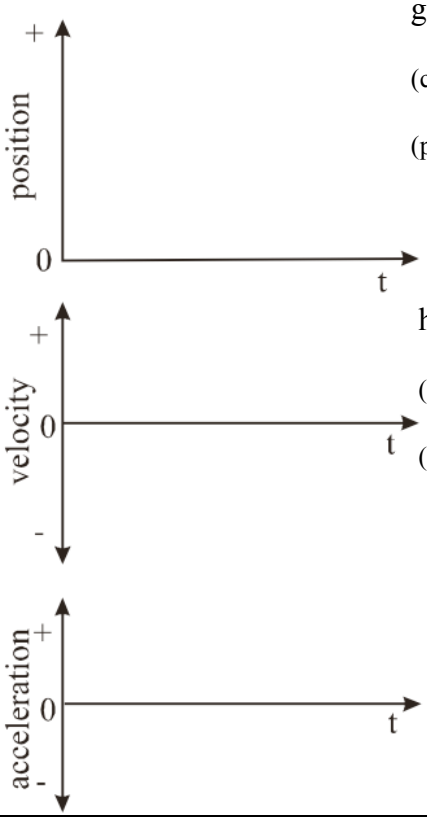
c. Is the velocity positive or negative?

d. Is the acceleration positive or negative?

e. Predict the graphs describing the motion.



f. Record the graphs as displayed by the motion detector.

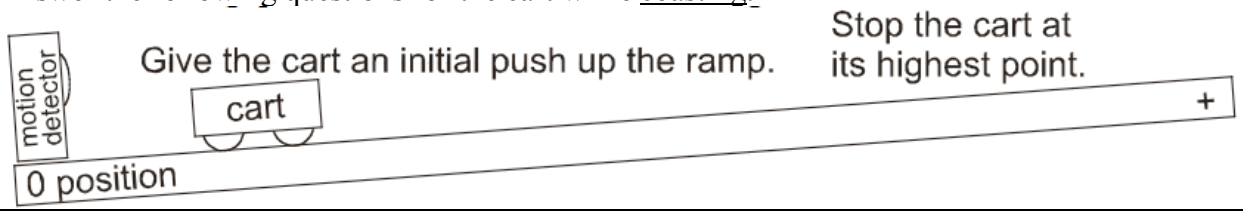


g. The slope of the position-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

h. The slope of the velocity-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

2. Decreasing speed in the positive direction

a. Without using the motion detector, observe the motion of the cart slowing after an initial push. Answer the following questions for the cart while coasting.

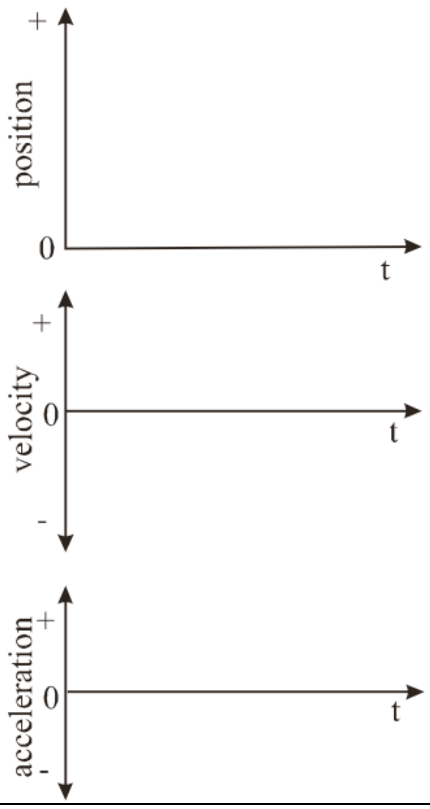


b. Draw a motion map including both velocity and acceleration vectors.

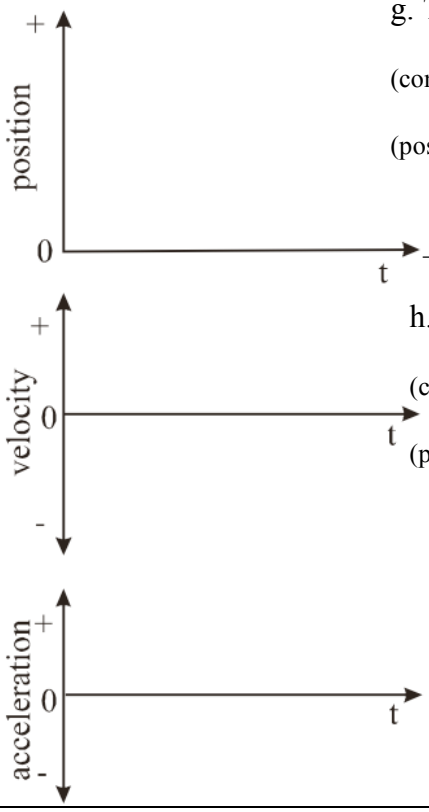
c. Is the velocity positive or negative?

d. Is the acceleration positive or negative?

e. Predict the graphs describing the motion.



f. Record the graphs as displayed by the motion detector.

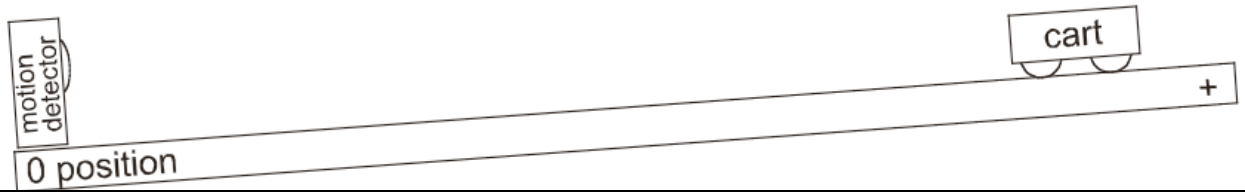


g. The slope of the position-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

h. The slope of the velocity-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

3. Increasing speed in the negative direction

a. Observe the motion of the cart starting from rest and rolling down the incline without using the motion detector.

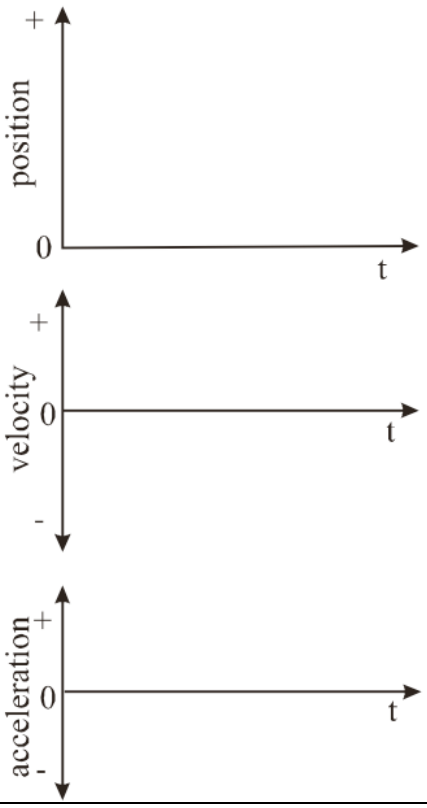


b. Draw a motion map including both velocity and acceleration vectors.

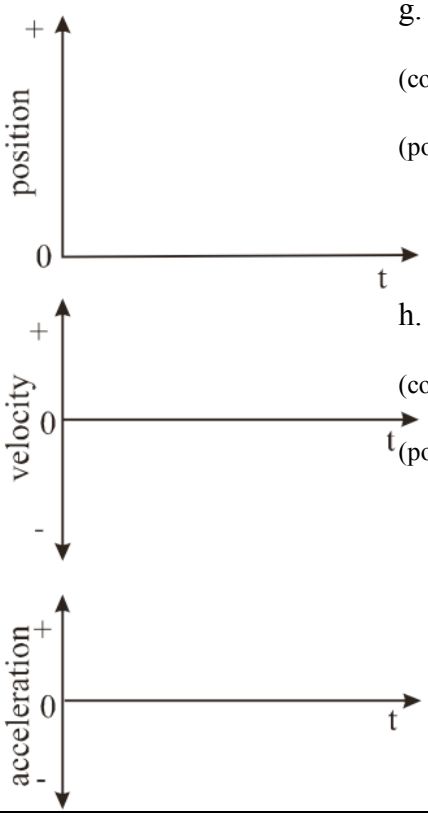
c. Is the velocity positive or negative?

d. Is the acceleration positive or negative?

e. Predict the graphs describing the motion.



f. Record the graphs as displayed by the motion detector.

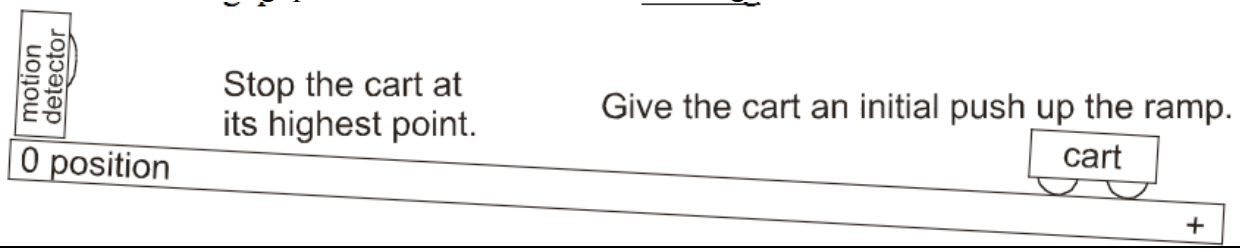


g. The slope of the position-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

h. The slope of the velocity-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

4. Decreasing speed in the negative direction

a. Observe the motion of the cart slowing after an initial push without using the motion detector. Answer the following questions for the cart while coasting.

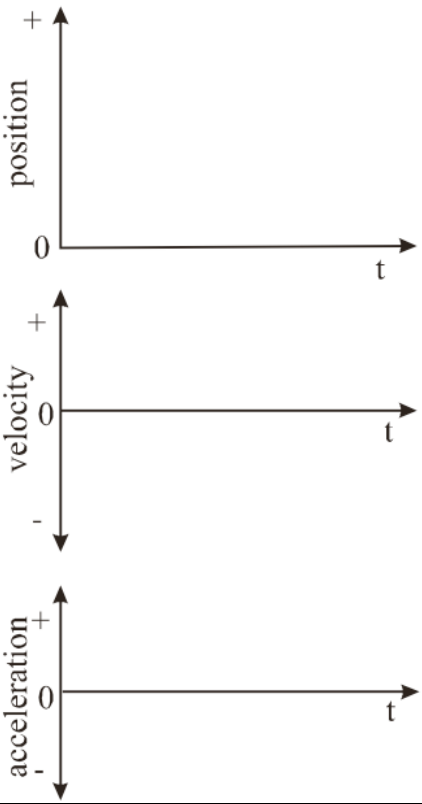


b. Draw a motion map including both velocity and acceleration vectors.

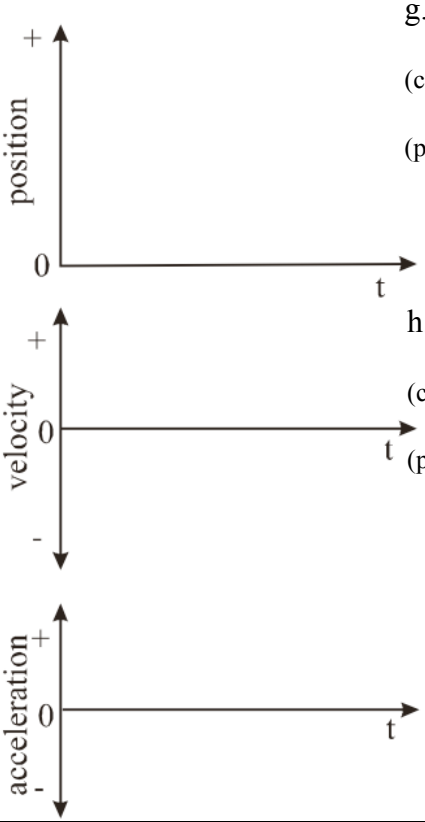
c. Is the velocity positive or negative?

d. Is the acceleration positive or negative?

e. Predict the graphs describing the motion.



f. Record the graphs as displayed by the motion detector.

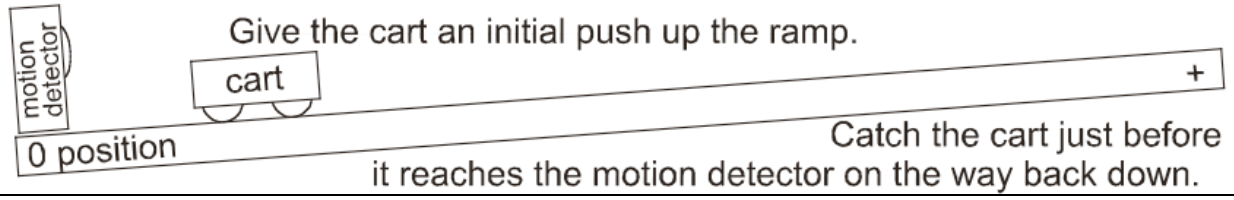


g. The slope of the position-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

h. The slope of the velocity-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

5. Up and down the ramp

a. Observe the motion of the cart after an initial push without using the motion detector. Answer the following questions for the cart while coasting.

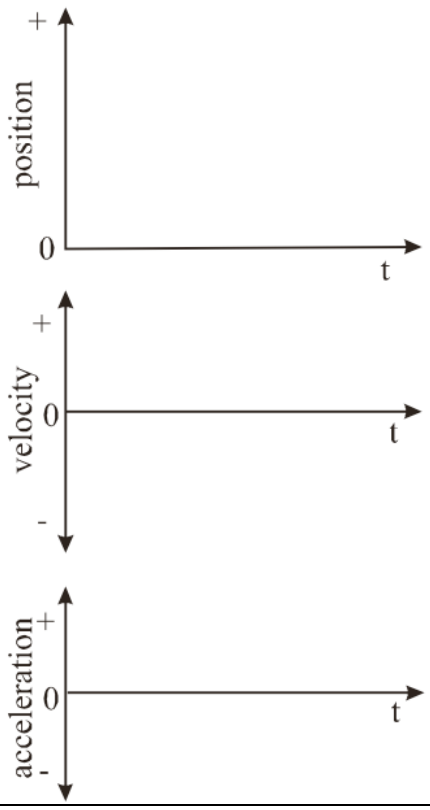


b. Draw a motion map including both velocity and acceleration vectors.

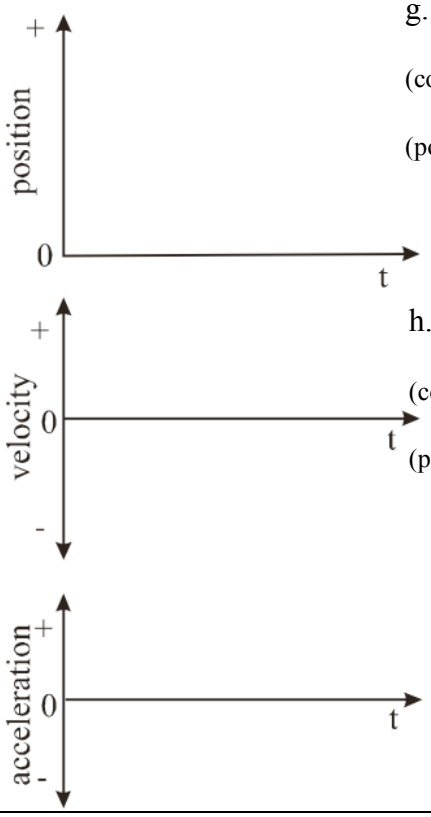
c. Is the velocity positive or negative?
Does the direction of the velocity change?

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

e. Predict the graphs describing the motion.



f. Record the graphs as displayed by the motion detector.

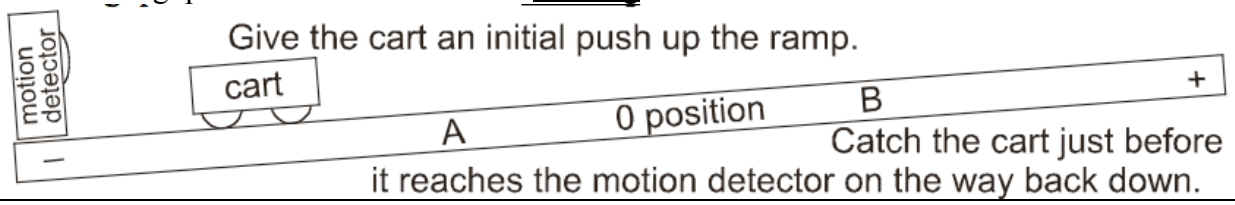


g. The slope of the position-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

h. The slope of the velocity-time graph is
(constant / increasing / decreasing)
and
(positive / negative)
and represents
_____.

6. Up and down the ramp with a different zero position

a. Observe the motion of the cart after an initial push without using the motion detector. Answer the following questions for the cart while coasting.

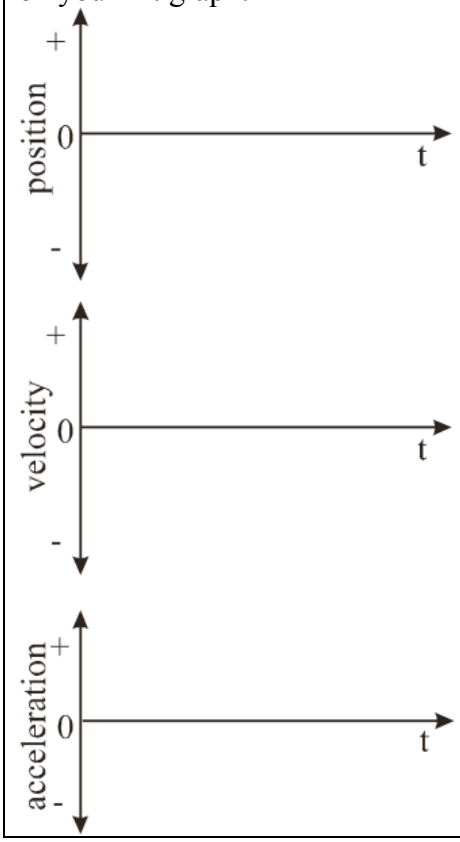


b. Draw a motion map including both velocity and acceleration vectors.

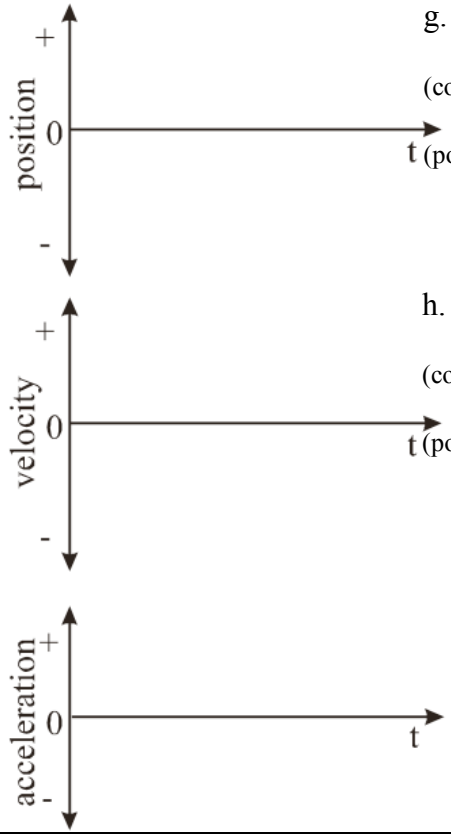
c. Is the velocity positive or negative?
Does the direction of the velocity change?
Is position A positive or negative?

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

e. Predict the graphs describing the motion. Label points A and B on your x-t graph.



f. Record the graphs as displayed by the motion detector.



g. The slope of the position-time graph is (constant / increasing / decreasing) and (positive / negative) and represents

_____.

h. The slope of the velocity-time graph is (constant / increasing / decreasing) and (positive / negative) and represents

_____.