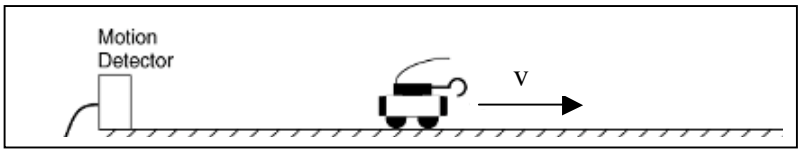
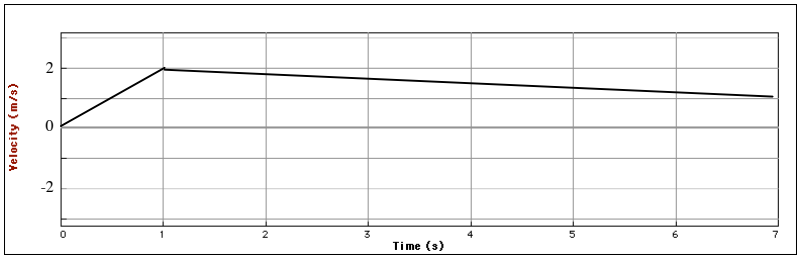
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles. The equations you need are on the equation sheet. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

1. A 300g cart initially at rest is given a push to the right along a level track beginning at t = 0s. The motion sensor plots the velocity as a function of time as shown in the graph at the right. Answer the following questions. Be sure to explain your answers for full credit.





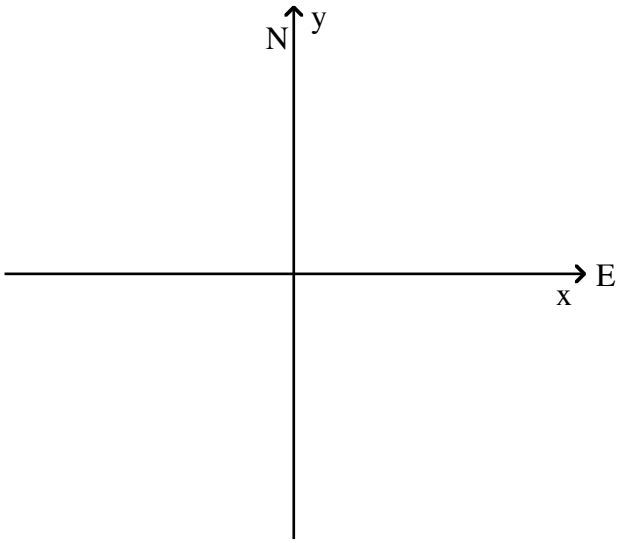
(a)How much time elapses while the cart being pushed? How do you know?

(b)How far does the cart travel while being pushed? How do you know?

(c)What is the acceleration of the cart travel while being pushed? How do you know?

(d)Describe the motion of the cart travel after the push is complete.

2. A cruise ship is 200km away from Houston at 30.0° south of east. The ship travels 100km due south. (a)Show the initial position, final position, and displacement at the right. (b)Find the final position (magnitude and direction) of the ship.



3. Three rocks are each thrown from the edge of a 20.0m high cliff. They all end up at the base of the cliff. Rock A is thrown straight downward with an initial speed of 10.0m/s. Rock B is dropped from rest. Rock C this thrown upward with an initial speed of 10.0m/s. Considering only the time from when they are released until just before they strike the ground, rank these rocks from largest to smallest according to:

(a)the distance they travel.

(b)their displacement.

(c)their initial speed.

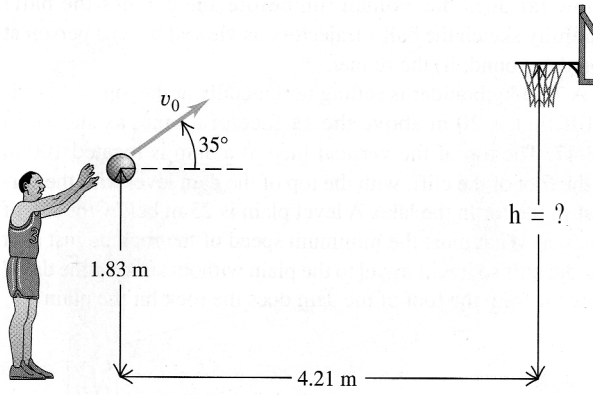
(d)their initial velocity.

(e)their final speed.

(f)their final velocity.

(g)their acceleration.

4. A free throw is made by shooting the ball at 8.65m/s at 35.0° above horizontal from 1.83m above the ground. The basket is 4.21m away. Find (a)the time the ball is in the air and (b)the height of the basket.



5. Earth has a radius of 6380km and spins around once every 24.0h day. (a)Find the acceleration (in m/s^2) of a person standing at the equator. (b)Find the radius of a planet that has the same spin rate as Earth, but the acceleration of a person on the equator is $9.80 m/s^2$.