Newton, Isaac

**phys1110** **Section 14**

Due Fri, Dec 12, 2008 at 09:00 Set 2

*CAPA* ID 2800

All answers should be submitted on the web. You have 5 tries for this homework.

**1.** [2pt] Identify each of the following as V-Vector, S-Scalar. . (If the first is V and the rest S, enter VSSSSS).

A) Acceleration of a runner.

B) Force of gravity.

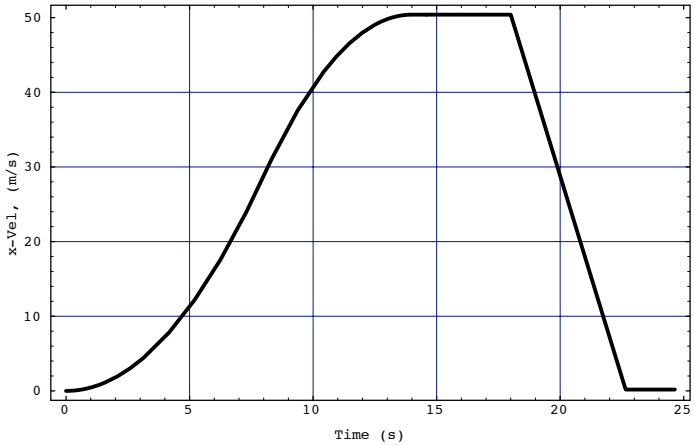
C) Mass of a pint of milk.

D) Velocity of a train.

E) Speed of a train.

F) Volume of a cube.

**2.** [2pt] The velocity of a cart on a track traveling along the +x direction is plotted in the figure. Graphically evaluate the x-acceleration of the cart at time t=6.6 $s$. (Remember to properly enter units! See problems 1 and 2 from last week.)




**3.** [2pt] Evaluate the distance the cart travels from 18.0$s$ to 20.0$s$.

**4.** [2pt] A ball is thrown vertically upwards with an initial velocity of 20.84 $m/s$. Neglecting air resistance, how long is the ball in the air?

**5.** [2pt] What is the greatest height reached by the ball?

**6.** [2pt] Calculate the time at which the ascending ball reaches a height of 15 $m$ above the ground.

**7.** [2pt] An object is moving in a straight line with a constant acceleration. Its position is measured at three different times, as shown in the table below.

| Time (s) | Position, (m) |
|---|---|
| 44.70 | 9.200 |
| 46.30 | 13.744 |
| 47.90 | 22.256 |

Calculate the magnitude of the acceleration at t=46.30$s$.

**8.** [2pt] To save fuel, some truck drivers try to maintain a constant speed when possible. A truck traveling at 111.0 km/hr approaches a car stopped at the red light. When the truck is 201.2 meters from the car the light turns green and the car immediately begins to accelerate at 2.40 m/s$^2$ to a final speed of 113.0 km/hr. How close does the truck come to the car assuming the truck does not slow down?

**9.** [2pt] How far from the stop light has the car travelled when the truck reaches its closest distance?

**10.** [2pt] A person who is properly constrained by an over-the-shoulder seat belt has a good chance of surviving a car collision if the acceleration does not exceed roughly 25.0 "g's" in magnitude (1.00 g = 9.80 $m/s^2$). Assuming uniform acceleration of this value, calculate the distance over which the front end of the car must be designed to collapse if a crash brings the car to rest from 100 $km/hr$.

**11.** [2pt] List 4 or more ideas about vectors that you can discover/verify using the PhET Vector Addition simulation. Give an example of a vector concept that you cannot discover using the simulation. It's available online from the class homepage: Or go to http://phet.colorado.edu and search Vector Addition

**12.** [2pt] CU is having a catapult contest. Cash prizes are being awarded for farthest distance, longest time of flight (time in the air), and most accurate catapulting (hitting a target). The judges pick what objects each team must catapult - they will not necessarily be same as the objects in the simulation. Explore the PhET Projectile Motion simulation thoroughly. (Go to course homepage or to http://phet.colorado.edu and search Projectile Motion) What do you learn from your investigation using the simulation and how does it guide your design of the catapult?