Advanced Physics I   Chapter 2 Problem Set   Name________________________

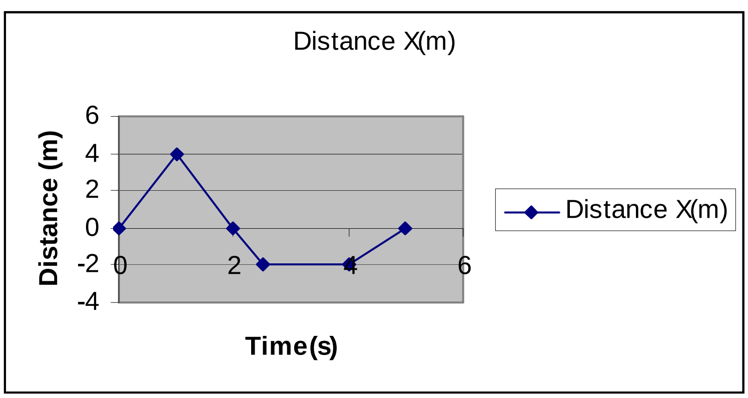
1. If the velocity of a car is nonzero, can its acceleration be zero? Explain. If the car has a velocity of zero can it have an acceleration of nonzero? Explain. If the car is traveling west can the acceleration be east? Explain.

2. Two kids are playing with tennis balls. One drops his and at the same time his friend throws hers. Describe the acceleration and velocity of each ball at its highest and lowest point?

3. Joe and Amy are traveling Canada where the speed limits are in km/hr. If they are driving from London Ontario to Toronto (straight east) for 30.0min at 80.0km/hr and 12.0 min at 100.0km/hr and 45.0min at 40.0km/hr and stop for gas and lunch for 30.0min, determine the average speed and the distance traveled.

4. A kayak race is held between Mr. L and Dr. H across the NO Pond from east to west and back, a total distance of 120m. Mr. L, the far more experienced kayaker, travels the first leg at 6.0km/hr and the same for the second leg. Dr. H who is just learning travels the first leg at 3.0km/hr. He then realizes he must sprint as hard as he can and returns at the incredible speed of 9.0km/hr. Who wins and by how much? What is the average speed of each?

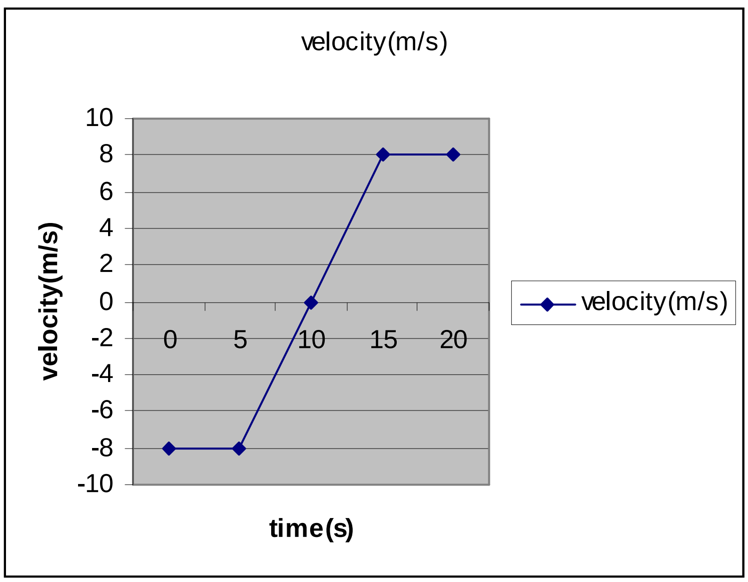
5. Dr. H challenges Mr. L to a tennis match. If the graph below is a representation of Dr. H moving in a straight line find his average speed from; 0 to 1.0s, 0 to 4.0s, 1.0s to 5.0s and 0 to 5.0s. What are his instantaneous velocities at; .50s, 2.0s, 3.0s and 4.5s?



6. The space station travels at 6.521 km/sec at an altitude 412km. How much time is required for it to make a complete orbit?

7. Mr. K has a very slow car. At night he gets on I-88 with an initial speed of 7.0m/s and accelerates for 4.0s at a rate of .80m/s^2. Make a rough sketch velocity vs. time graph and acceleration vs. time graph. Using acceleration equals the change in velocity over time; find his velocity after each whole second.

8. The graph below represents a train coming in to a loading dock, passing its bay and heading back out. Find the average acceleration of the train during the intervals; 0 to 5.0s, 5.0s to 15.0s, and 0 to 20.0s. Find the instantaneous acceleration at 2.0s, 10.0s and 20.0s. What is the slope at these points?



9. Mr. L is driving home at 20.0m/s and spots a dollar 100.0m ahead of him in the road. If he hits his old worn out brakes and accelerates at -1.00m/s^2 will he stop in time to get the dollar?

10. A ball is thrown vertically upward with and initial velocity of 25.0m/s. How high will it rise and how long will it be in the air? What is its velocity when it reaches the initial height?

11. A rocket moves upward, starting from rest with an acceleration due to the net force of the engine and gravity of $+29.4 m/s^2$ for 4.00s. It runs out of fuel at the end of this 4.00s and continues to move upward for a while. How high does it rise above the starting point?

12. A parachutist with a camera, both descending at a speed of 10.0m/s, accidentally drops the camera at an altitude of 50.0m. What is the time and velocity difference between the camera and the parachutist hitting the ground?

13. A helicopter is delivering supplies to people stranded by a flood. The pilot drops the supply bag when she is descending at a steady rate of 1.50m/s. What is the speed and position below the helicopter of the bag after 2.00 seconds? When she delivers the next bag of supplies the copter is rising 1.50m/s. What is the position and speed after 2.00s?

14. A rubber ball is released at chest height and bounce almost all the way back to the original position. The ball will be temporarily deformed by one centimeter where it makes contact with the pavement. Estimate maximum acceleration.