Physics First **One-D Motion** Review Sheet **[2013]**

DISTANCE and DISPLACEMENT Review Problems

1. What is the difference between distance and displacement?
2. Define "scalar" and "vector".
3. Tricia runs suicides for basketball practice. She runs 10 feet to the right, 10 feet to the left, 20 feet to the right, 20 feet to the left. What is her total distance and displacement?
4. While John is traveling along a straight interstate highway, he notices that the mile marker reads 260. John travels until he reaches the 150-mile marker and then retraces his path to the 175-mile marker. What is John's displacement from the 260-mile marker?
5. Patrick cycles up and down the Colorado mountains. He travels 400 meters north and 800 meters south. What is his total distance and displacement? What would he have to do to have a displacement of zero from where he is at the end of his ride?

SPEED AND VELOCITY Review Problems

1. Define "speed" and "velocity". Which is a scalar quantity and which is a vector quantity?
2. What is the equation for average speed? What is the equation for average velocity?
3. If a car travels 400 m at a constant speed in 20 seconds how fast is it going?
4. It takes Serina 15 minutes to drive to school. Her route is 16 km long. What is Serina's speed on her drive to school in km/min? What is her speed in km/hr?
5. How much time would it take an airplane to reach its destination if it traveled at an average speed of 790 km/hr for a distance of 4,700 km?
6. How long (in MINUTES) would it take you to swim across a lake that is 900 meters across if you swim at a seed of 1.5 m/s?
7. Umbro the beagle is chasing after a tennis ball being thrown by his owner (and best friend). He runs 40 meters to the right in 4 seconds, then all the way back in 6 seconds. What is his average speed and average velocity?
8. The next time his owner throws the ball, Umbro runs for 60 meters in 5 seconds, but is moving so quickly he overshoots his target. He backtracks 20 meters in 2.2 seconds. What is his average speed and velocity?
9. You drive your car for 2.0 h at 40.0 km/h, then for 2.0 h at 60.0 km/h in the same direction. What is your average velocity? (Hint: You must first figure out the displacement!)

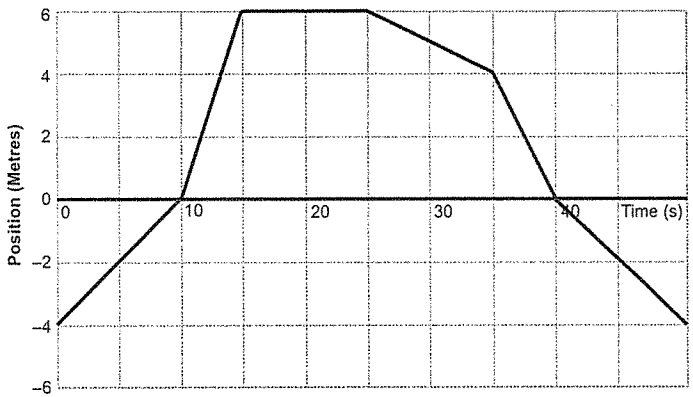
ACCELERATION Review Problems

1. Define acceleration. What are the units of acceleration?
2. What does it mean to have a constant acceleration?
3. In what three cases do you have acceleration occurring?
4. In what direction must the acceleration be pointing if you have
   a. velocity to the right, speeding up
   b. velocity to the left, speeding up
   c. velocity to the right, slowing down
5. A car's velocity changes from 20 m/s to 13 m/s in 5 seconds. What is the car's acceleration?
6. A rowing team covers a distance of 200 meters over a time of 75 seconds. If they started from rest, what would be their final velocity?
7. What is the initial velocity of a unicyclist who travels 30 meters in 14 seconds at an acceleration of 0.25 m/s^2?

Note: These problems are only meant to be an <u>overview</u> of the questions you might encounter in the test. A thorough review for the test will entail looking over your <u>notes, homework, and **past quizzes**</u>.

SLA Student Learning Activity

Appendix 3.8: Motion: Interpreting Position-Time Graphs



The position-time graph above represents the motion of a remote-controlled toy truck as it moves back and forth along a straight line. The origin marks the position of the boy who controls the truck. The boy has not yet learned how to make the truck change its direction.

A positive position marks positions to the right of the boy, and a negative position marks positions to the left of the boy.

1. During which time intervals is the truck to the right of the boy? _____

   To the left of the boy? _____

2. During which time intervals is the truck moving in the positive direction? _____

   In the negative direction? _____

   Not moving? _____

3. What is the position of the truck at 0 seconds? ____ 15 seconds? ____

   30 seconds? ____ 45 seconds? ____

4. When is the truck ~~in front of~~ to the Right of the boy?

5. Describe, in words, the position-time story of the motion that the truck showed during this 50-second interval.

The graph of position-time gives **directly** some information about the motion. This tells the position-time version of the story of this motion (that is, where the truck is at a particular instant in time).

The graph of position-time also gives **indirect** information about the motion of the truck. The following questions deal with obtaining this indirect information, such as distance travelled, displacement, average speed, and average velocity.

6. How far did the truck travel during the following time intervals?

   0–10 s _____ 10–15 s _____ 15–25 s _____

   25–35 s _____ 35–40 s _____ 40–50 s _____

7. What was the displacement of the truck during the following intervals?

   0–10 s _____ 10–15 s _____ 15–25 s _____

   25–35 s _____ 35–40 s _____ 40–50 s _____

8. Average speed is given by the distance travelled divided by the time interval. Calculate the average speed for each interval:

   0–10 s _____

   10–15 s _____

   15–25 s _____

   25–35 s _____

   35–40 s _____

   40–50 s _____

Remember that speed is equal to $\frac{\text{distance}}{\text{time}}$

It is also the slope of a position time graph!