A-day: Due Mon., Sept 14
B-day: Due Tues., Sept 15

2009 PreAP Linear Motion 6

1. For each of the following tell me if the amount of distance traveled each second increases or decreases.
   A. _____ If at constant velocity.
   B. _____ If it starts at rest, is moving to the right, and has a + acceleration.
   C. _____ If it is moving to the left and has a negative acceleration.
   D. _____ If it is moving up and has a negative acceleration.
   E. _____ If it is moving to the left and has a positive acceleration.

2. An object is moving at a constant velocity of 2 m/s ***to the left***.
   A. What is Vi?
   B. What is Vf?
   C. What is the acceleration of the object?
   D. How long does it take to go 25 meters?

Remember that if an object is at constant velocity you can use V = D/T (or S = D/T).
That means we actually have SIX equations: S = D/T and the five kinematics.

Let's understand average velocity, speed, displacement, and distance a bit.

3. An object moves to the right at 12 cm/sec for 3 seconds. Then the object moves to the left at 4 cm/sec for 2 seconds.
   A. What is the object's displacement in the first 3 seconds?

   B. What is the object's displacement in the last 2 seconds?

   C. What is the object's total displacement (how far is it from its initial position)?

   D. Since average velocity is displacement over time, what is the average velocity of the whole trip?

   E. What is the total distance the object traveled?

   F. Speed is D/T. What is the average speed of the object during the trip?

We are going to use this next graph twice, for two different concepts.

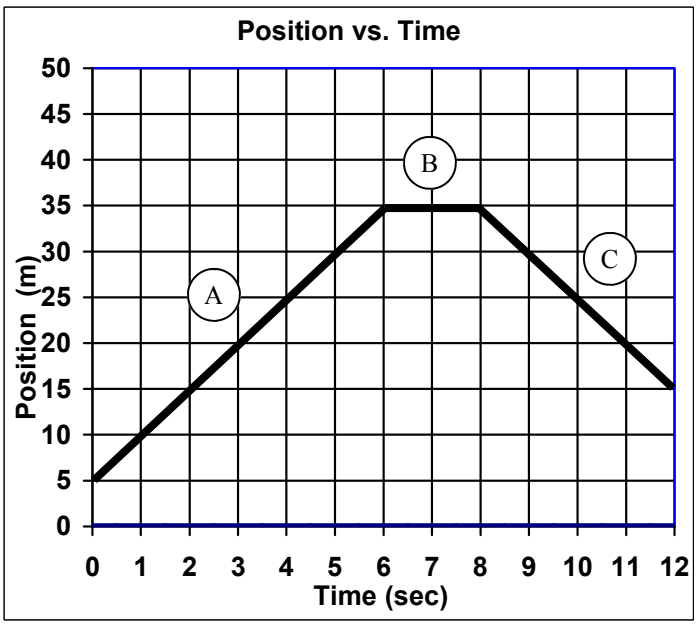
4. A. What is the average velocity of the object during the first 6 seconds of the graph?

Remember: displacement between 2 position is the difference: final position − initial position ($x_f - x_i$). *You don't care about the in between displacements, only the end points.*

   B. What is the displacement of the object for the first 8 seconds of the graph?

   C. What is the average velocity for the first 8 seconds?

   D. What is the average velocity of the entire graph?



5. An object at rest begins to accelerate to the left. It travels 112 m to the left in 14 seconds. What is the final velocity of the object?

6. An object is moving 6 m/s to the right. Then it accelerates at +3 m/s^2 for 4 seconds. What is its displacement?

7. An object is thrown into the air.
   A. As it moves up, is its displacement + or −?
   B. As it moves up, is its velocity + or −?
   C. At the very top, what is its velocity?
   D. One second after the object is at the very top, is its velocity + or −?
   E. Does the object change velocity after it reaches the top?
   F. What is the acceleration of the object at the very top?
   G. As the object falls back to the ground, is its velocity + or −?
   H. As the object falls, what is its acceleration?

From the "Freefall" notes:

8. When an object is dropped or thrown, what is its acceleration?

9. A feather is dropped.
   A. Is the feather in free-fall?
   B. Why or why not?

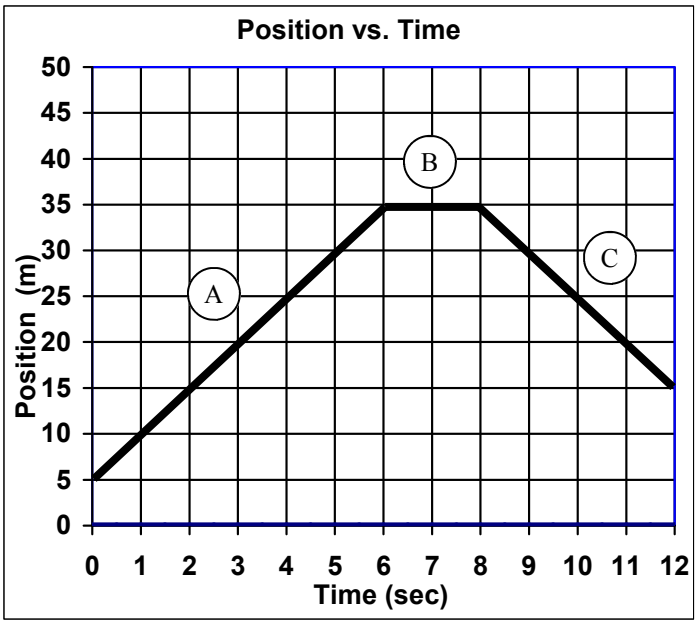
10. If we ignore air resistance, which object will hit the ground first: a heavy or light object?

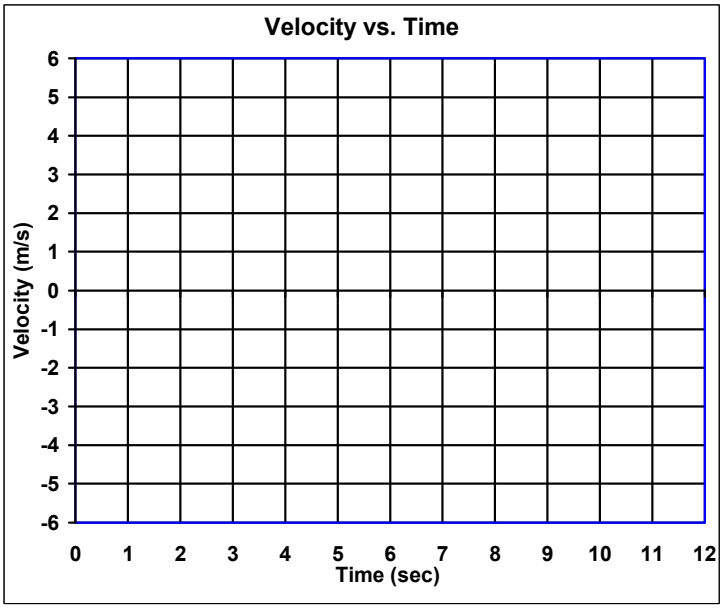
11. An object is dropped from 18 m in the air.
   A. What is its initial velocity?
   B. What is its displacement?
   C. What is its acceleration?
   D. Solve for final velocity of the object just before it hits the ground.

12. An object is thrown into the air. You want to know how high up it goes.
   A. Is its displacement going to be + or −?
   B. What will be its final velocity at the very top?
   C. How did does it go?

13. An object is thrown 12 m/s into the air from the ground. If it lands back on the ground, calculate the time it was in the air.

(*We need one more page to be ready for the test.*)





(*Notes: "Translating Graphs"*)
Use the graphs to answer the following:

14. A. What is the velocity of line A above? (*Hint: slope*)

    B. What is the velocity of line B above?

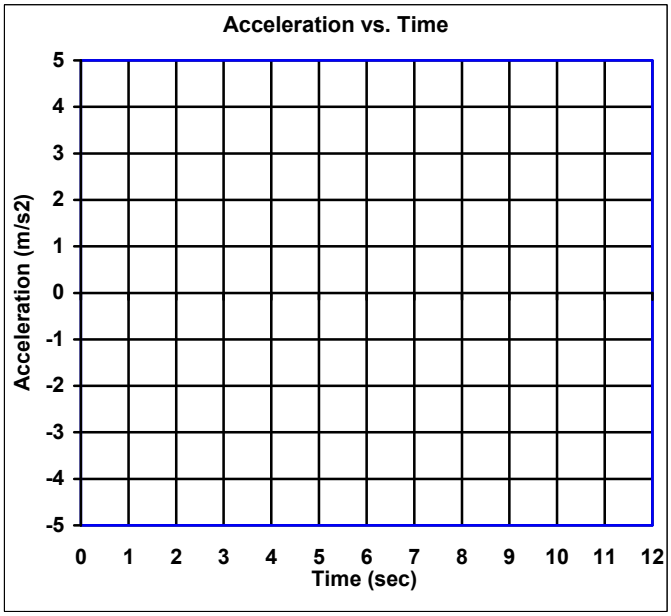
    C. What is the velocity of line C above?

    D. Graph these three velocities on the velocity graph above.

    E. Figure out the acceleration of each of the lines on the velocity graph.

    F. Transfer these three lines to the acceleration graph.

You should now see that any straight line on the position vs. time graph makes a flat line on the velocity graph AND zero acceleration.



Use the "Translating Graphs" notes to do the following translation.

15. Do this exactly as I describe it:
    A. On the position graph, calculate the slope of the first and third line segment and graph them on the velocity graph.
    B. Since you can't easily calculate the changing slope of the middle part, just connect the first and third segments on the velocity graph with a straight line.
    C. Calculate the slopes of each of the three segments on the velocity graph and transfer them to the acceleration graph.