2011 PreAP Linear Motion 6

1. Let's learn about units.   An object begins at rest.   It accelerates at 4 m/s². This means it gains 4 m/s every second.
    A.   How fast is it going after 1 second?   B.   After 2 seconds?   C.   After 3 seconds?

2. * An object is moving 2 m/s and accelerates for 6 seconds at 5 m/s². Use a kinematic equation to find its final velocity.
    A.   Write the variables   B. Choose an equation:
         and numbers: C. Put in #s and solve:

3. * A car is moving 12 m/s to the right and after 20 seconds it is moving 42 m/s to the right. How far did it travel in that time?
    A.   Write the variables   B. Choose an equation:
         and number below: C. Put in #s and solve:

4. An object moving 16 m/s stops in 18 meters. What is the acceleration of the object?
    A. Variables: B. Equation: C. Solve:
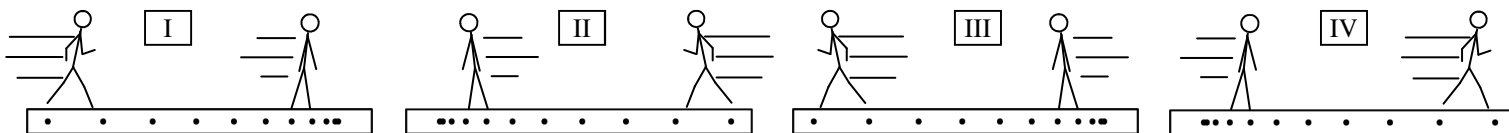

5. Meet Slim Jim, he's very Slim.   Slim Jim is going to help us learn Physics this year.   Right now Jim is going to help us understand positive and negative acceleration. Thanks, Jim!   (*Assume right is +, just like in math.*)

    A.   * In which diagram is Jim speeding up in the + direction?   (*This is a positive acceleration.*)
    B.   * In which other diagram do the dots also show a + acceleration (dots look the same)?
    C.   * What is Jim doing in this other diagram?
    D.   In which diagram is Jim speeding up in the − direction?   (*This is a negative acceleration.*)
    E.   In which other diagram do the dots also show a − acceleration?
    F.   What is Jim going in this other diagram?
    G.   Write +a or −a under each label (under the I, II, etc) on each diagram.

    Now, using what you just learned…

6. + or − acceleration?

    A. _____ An object is speeding up to the left.   C. _____ An object is moving right and speeding up.
    B. _____ An object is moving to the right and slowing down.   D. _____ An object is moving left and slowing down.
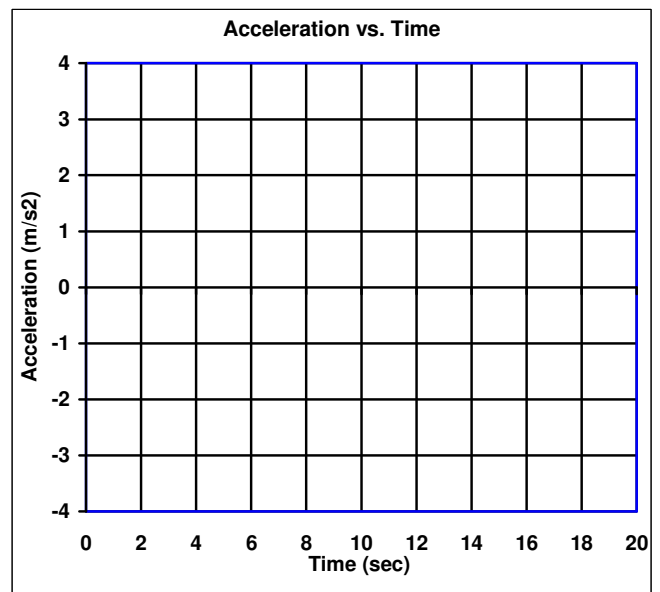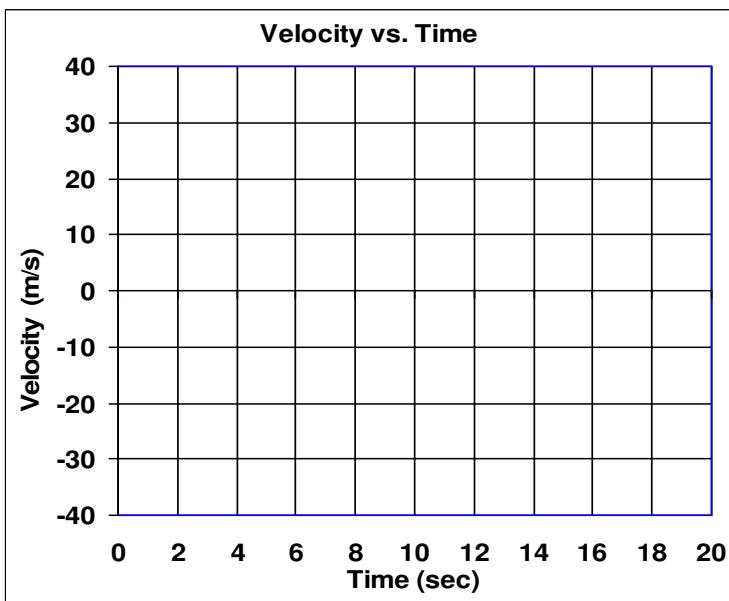
7. Use the position vs time graph at the right to answer the following.
    A. Which segment has the fastest velocity?
    B. Which segment shows the object at rest?
    C. Give the letters from slowest to fastest:
    D. What is the object doing (use the information from the above answers)?

    (*Next page*)

Position vs. Time

(graph: Position (m) vs. Time (sec), with curve marked I, II, III)
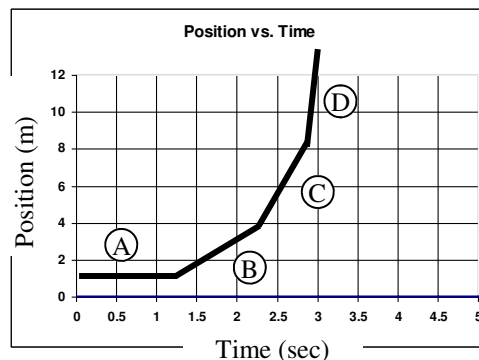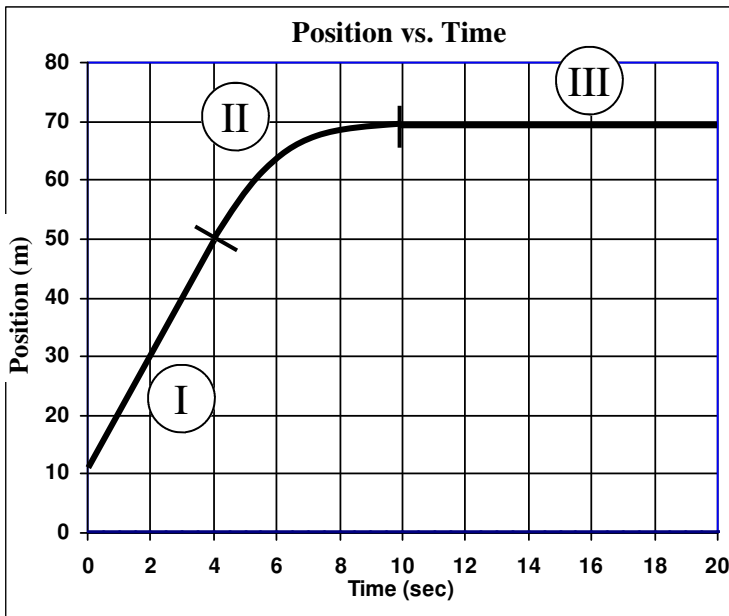
OK—let walk you thru the next level.

8. You already know how to do line segments I and III.

   A. Calculate the slope from 0 to 4 seconds.

   B. Graph this on the velocity graph (0 to 4 seconds only).

   C. Calculate the slope from 10 to 20 seconds.

   D. Graph this on the velocity graph (10 to 20 sec only).

   E. ON THE VELOCITY GRAPH connect line segments I and III with a straight line from 4 to 10 seconds.

   F. Transfer the velocity graph to the acceleration graph.

Velocity vs. Time

(blank graph: Velocity (m/s) vs. Time (sec))

Acceleration vs. Time

(blank graph: Acceleration (m/s2) vs. Time (sec))

2) Equation: Vf = Vi + at   Answer: 32 m/s
3) Equation: Δx = ½(Vf + Vi)t   Answer: 540 m
5A) IV   5B) II   5C) slowing down in neg direction