# 2012 PreAP Linear Motion 6

*Remember * means answer on back.*

1. Learning about units.   An object begins at rest.   It accelerates at 4 m/s^2.   This means it gains 4 m/s every second.
   A.   * How fast is it going to begin with?
   B.   * After 1 seconds?
   C.   * After 2 seconds?
   D.   After 4 seconds.

2. An object is originally moving 2 m/s. Then it accelerates for 6 seconds at 5 m/s^2.

   A.   * Since it is accelerating 5 m/s every second, how fast will it be moving after 1 second?
   B.   How fast will it be moving after 2 seconds?
   C.   * How much speed will it gain in 6 seconds of acceleration?

   D.   How fast will it be moving after 6 seconds of acceleration?

Meet Slim Jim, he's very Slim.   Slim Jim is going to help us learn Physics this year.
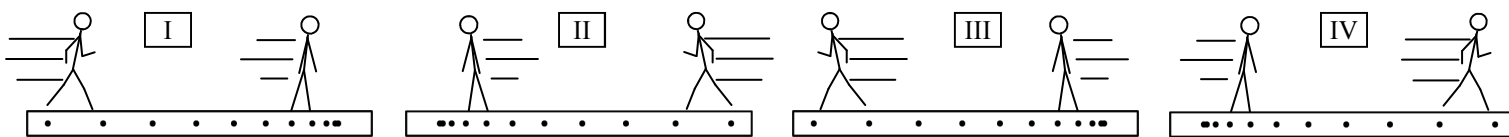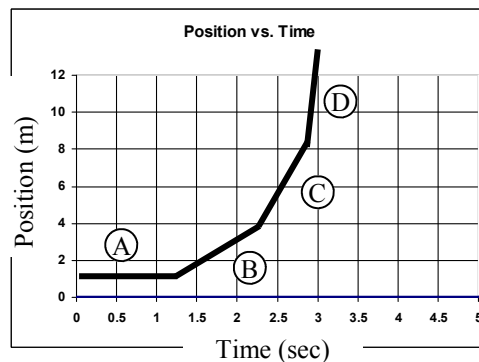

3. Slim Jim is going to help us understand positive and negative acceleration. Thanks, Jim!
   (*Assume right is +, just like in math.*)

   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?
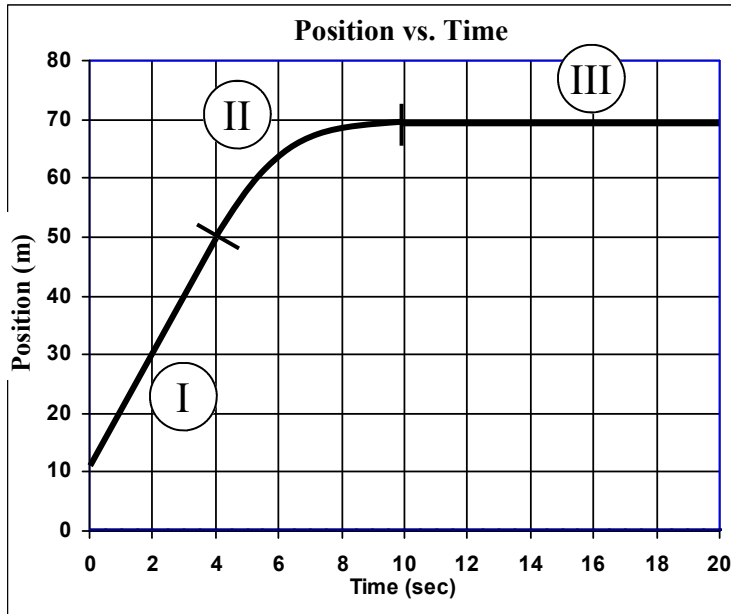   G.   Write +a or −a under each label (under the I, II, etc) on each diagram.

Now, using what you just learned…
4.   + or − acceleration?

   A.   ___ An object is speeding up to the left.
   B.   ___ An object is moving to the right and slowing down.
   C.   ___ An object is moving right and speeding up.
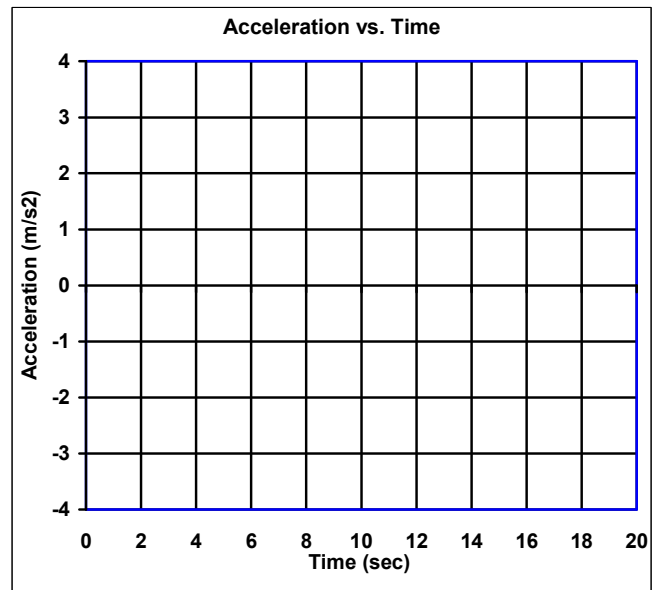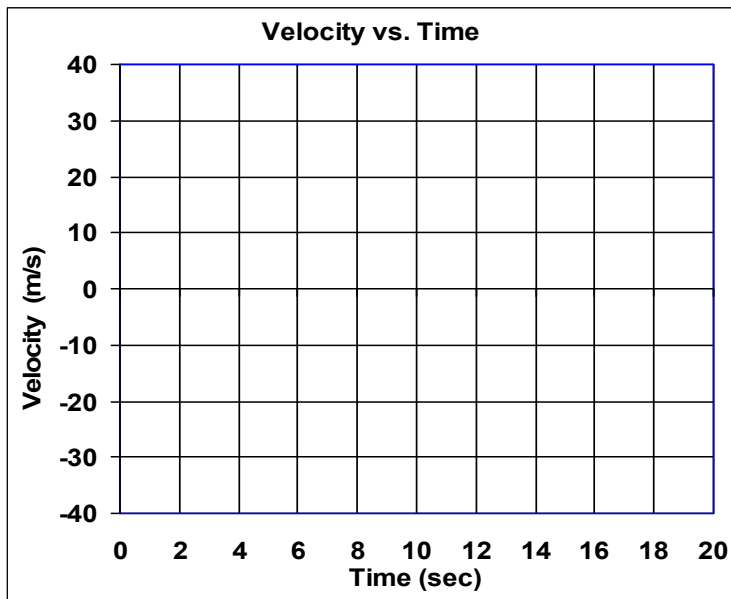   D.   ___ An object is moving left and slowing down.

5. 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)?

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Position vs. Time

Position (m): 80, 70, 60, 50, 40, 30, 20, 10, 0
Time (sec): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

II
I
III

OK—let walk you thru the next level. Follow EXACTLY.

6. 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

Velocity (m/s): 40, 30, 20, 10, 0, -10, -20, -30, -40
Time (sec): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Acceleration vs. Time

Acceleration (m/s2): 4, 3, 2, 1, 0, -1, -2, -3, -4
Time (sec): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

1A) 0m/s   1B) 0 + 4 = 4 m/s   1C) 0 + 4 + 4 = 8 m/s
2A) 2 + 5 = 7 m/s   2C) 6(5) = 20 m/s
3A) IV   3B) II   3C) slowing down in neg direction
6A) (50-10)/(10-0) = 40/4 = 10 m/s