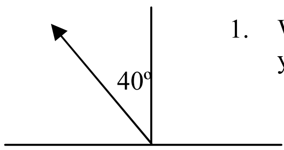
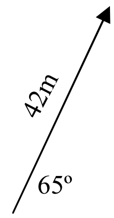
A-day: Due Thurs., Sept 9
B-day: Due Fri., Sept 10

2010-11 PreAP Linear Motion 6



1. What direction should you use for this vector?



2. Find the x and y components of the 42 m long arrow.

3. Let's learn about units. An object begins at rest. It accelerates at 4 m/s^2. This means that every second it gains 4 m/s of velocity.
   A. How fast is it going after 1 second? B. After 2 seconds? C. After 3 seconds?
   (*This is conceptual and not entirely true, number-wise, since it accelerates during each second, too. Let me show you.*)
   E. An object begins at rest and accelerates for 3 seconds at 4 m/s^2. What is its final velocity. Use the kinematic equations.

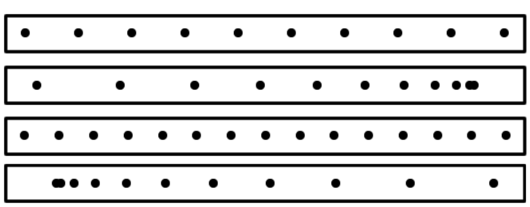
4. For each of the following tell me if the amount of distance traveled each second increases or decreases.
   A. If at constant velocity.
   B. If it starts at rest, is moving to the right, and has a + acceleration.
   C. If it is moving to the left and has a negative acceleration.
   D. If it is moving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

5. 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 24 meters?

   So, *if an object is moving 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.

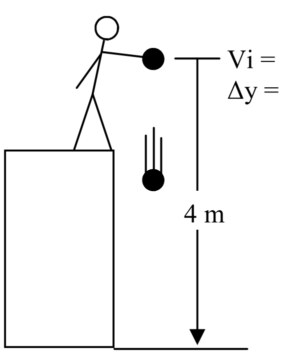
6. *(The kinematics work even with big and small numbers.)* A beetle walking 0.015 m/s is startled. It ends up walking 0.85m in 0.35seconds. Calculate the beetle's acceleration.

a.
b.
c.
d.



Use your "Speed" notes and "Acceleration" notes to answer the following:

7. The dots at the left show the positions of four different objects each second. (*There can be more than one answer for each question*).
   A. Which of the objects is at constant speed?
   B. Which of the objects is speeding up to the right?
   C. Which of the objects is slowing down to the right?
   D. Which of the objects have a positive acceleration?
   E. Which of the objects have zero acceleration?



Meet Slim Jim, he's very slim. Jim is going to help us understand physics, this year.

8. Slim Jim drops a ball from 4 m up.
   A. Jim is holding onto the ball to begin with, so what is its initial velocity?
   B. Since the ball is DROPPED, what is Δy for the ball?
   C. What is the acceleration of the ball?
   D. Use a kinematic equation to solve for the time the ball is in the air.

9. Freefall: yes or no?
   A. ____ A balloon is filled with air and you drop it.
   B. _____ A bowling ball rolls off of a desk to the floor below.

10. What is a vacuum?

11. In a vacuum, which would fall faster: a brick or a leaf?

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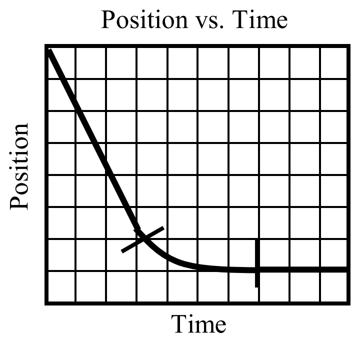
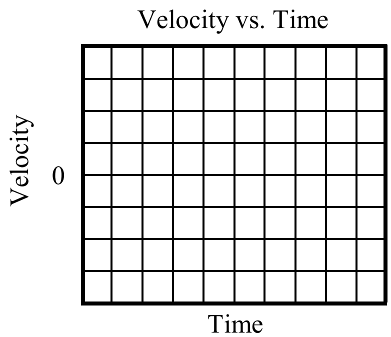
For each of the following two problems use the special situations on the "Freefall" notes to assign your variables.

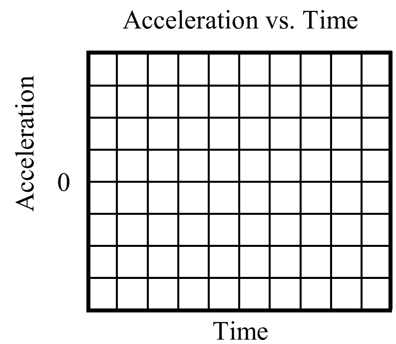
12. A ball is thrown into the air going 50 m/s. If it was thrown from the ground and lands back on the ground, how long was it in the air?
    Variables: Equation: Solve:

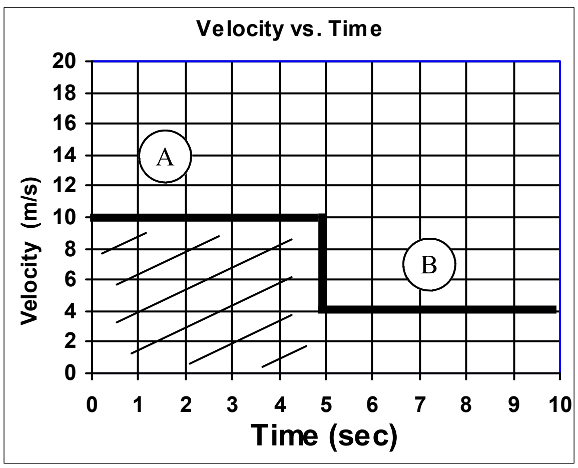
13. A rock is thrown into the air going 15 m/s. How high does it go?
    Variables: Equation: Solve:

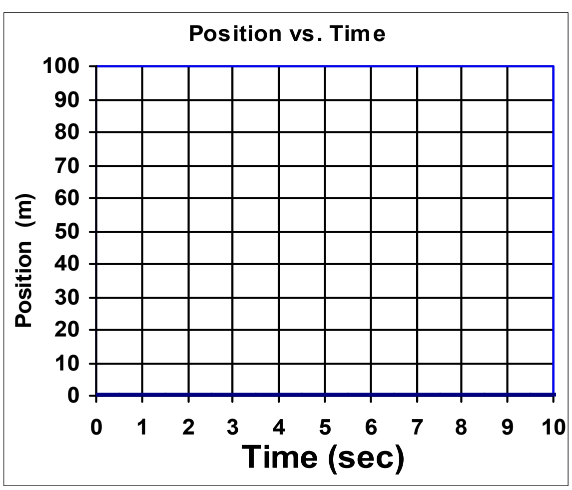
14. Transfer the Position vs. Time graph to the velocity and acceleration graphs below.
    This time you can assume that each vertical square is 1 m and each horizontal square is 1 sec.











15. Let's learn about transferring graphs backwards.
    A. For segment A, calculate how far the object must have travelled in the first 5 seconds. (*You have speed*.)

    B. Calculate the shaded area under line segment A.

    Hmmmm. So, area = displacement.

    C. Find the displacement of the object during line segment B's time (*you now have 2 ways*).

    D. What is the object's total displacement?

    Just to make things easier, let's start at 0 m.

    E. Starting at 0m, where does the object end up at the end of 5 seconds? (*See part A, above.)*

    F. Graph this point on the position graph and connect the dots.

    G. From this point, go to the object's final position. And connect the dots.

16. Graph and straighten this second set of data. (*You should now have four graphs: two are not straight and two are. See "How to Straighten Graphs" if you need help doing this*)

x	y
Pressure (Pa)	Volume (m^3)
0.03	23980
0.06	11890
0.09	7998
0.12	6037
0.15	4806
0.18	4003
0.21	3448
0.24	2987

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