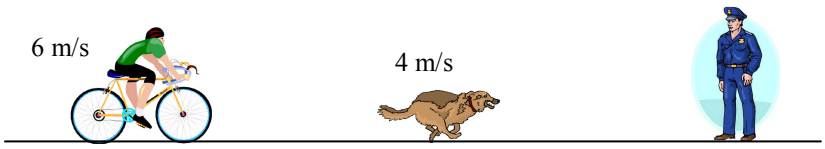
A-day: Due Thurs., Sept 24
B-day: Due Fri., Sept 25

2009 Linear Motion 5

1. A rock is dropped from 35 meters. How fast is it going just before it hits the ground?
   Variables: Equation: Solve:

2. A car going 45 m/s stops in 8 seconds. Calculate its acceleration.
   Variables: Equation: Solve:

3. A biker is following a running dog, as shown on the diagram. A policeman is watching from the sidewalk.

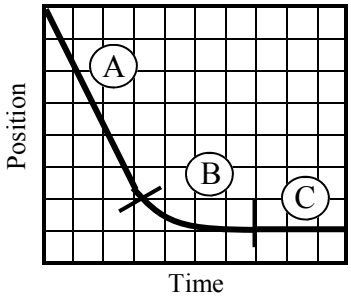


   A. What is the velocity of the bicyclist in the policeman's frame of reference?

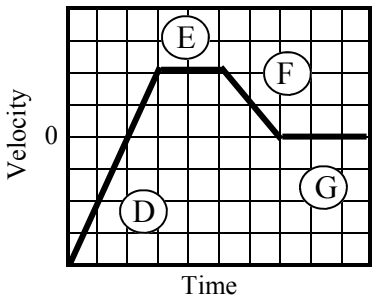
   B. What is the policeman's velocity in the bicyclist's frame of reference?

   C. How fast is the dog moving in the bicyclist's frame of reference?

Graph I Position vs. Time



Graph II Velocity vs. Time

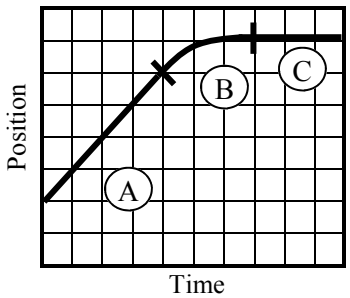


4. +, −, or 0
   A. _____ Velocity for an object that doesn't change position.
   B. _____ Acceleration if the Δv is negative.
   C. _____ Acceleration if the velocity changes from negative to positive.
   D. _____ Velocity if the object's change of position is negative.
   E. _____ Acceleration if the object stays at the same velocity.

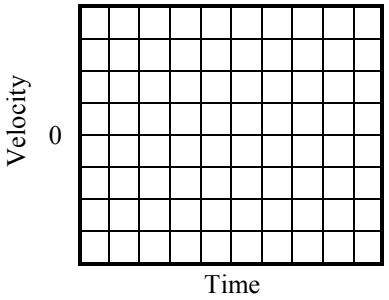
5. Use the two graphs at the right to answer the following.
   (*There can be more than one answer.*)
   A) _____ Which segment/s show an object at rest?
   B) _____ Which segment/s show an object with positive Δv?
   C) _____ Which segment/s show an object with positive velocity?
   D) _____ Which segment/s show an object with negative velocity?
   E) _____ Which segment/s show an object with positive acceleration?
   F) _____ Which segment/s show an object with negative acceleration?

6. Transfer the position vs. Time graph to the velocity and acceleration graphs below. You can assume that each vertical square is 1 m and each horizontal square is 1 sec.

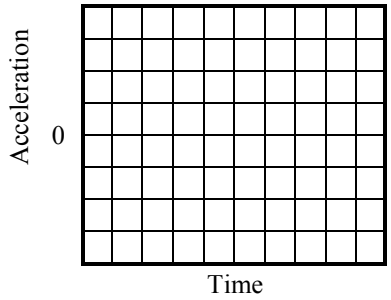
Position vs. Time



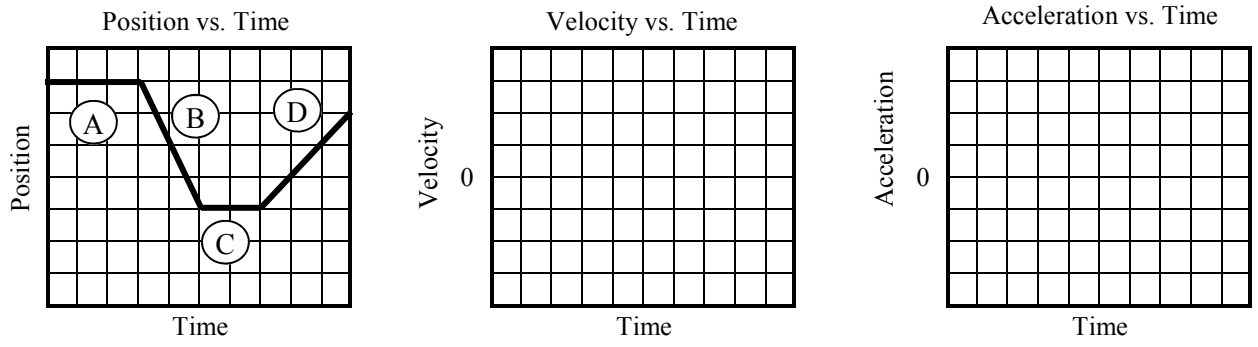
Velocity vs. Time

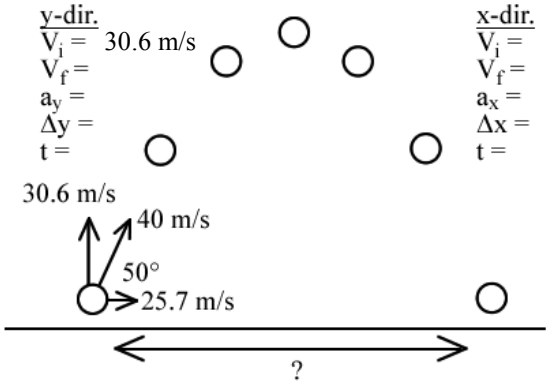


Acceleration vs. Time



7. Transfer the Position vs. Time graph to the velocity and acceleration graphs below. Again, each vertical square is 1 m and each horizontal square is 1 sec.

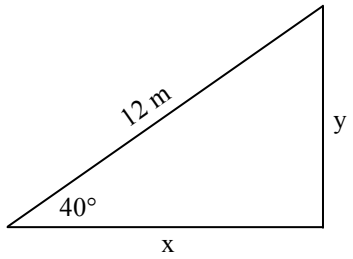




8. The diagram at the left shows a ball being shot from the ground to the ground.
   A. The y-direction is just freefall, where its initial vertical velocity is 30.6 m/s. Since it is shot from the ground to the ground, find the time it was in the air.
   Variables: Solve:
   a =
   V_i = 30.6m/s
   Δy =
   V_f =
   t =

   B. In the x-direction it's acceleration is 0 m/s2 OR it is at constant velocity, with an initial velocity of 25.7 m/s. Using the time you found in the previous problem, how far did it go in that time?

$\sin\theta = \frac{\text{opp.}}{\text{hypo.}}$ $\cos\theta = \frac{\text{adj.}}{\text{hypo.}}$ $\tan\theta = \frac{\text{opp.}}{\text{adj.}}$



9. A. Assign variables from the triangle at the left.
   θ =
   opp. =
   adj. =
   hypo. =

   B. Using the formulas and variables above, find the length of x and y.

