Linear Motion Practice

1. A person swims 4 complete laps in a 30 m long pool. *(30 m is one way. 1 complete lap is there and back.)*
   A. What distance did they travel? 1 lap = 60m 60m x 4 240m
   B. What is their total displacement? 0m same location as origin

For each of the following situations give detailed descriptions including horizontal/vertical (x or y) and +/–.

2. A ball is thrown into the air. As it is going up
   A. Displacement is: +
   B. Velocity is: +
   C. Acceleration is: neg

3. A ball is rolling to the right and slowing down.
   A. Displacement is: +
   B. Velocity is: +
   C. Acceleration is: –

4. An object stops after moving 12 m/s to the right.
   A. What is its initial velocity? 12m/s
   B. What is its final velocity? 0m/s
   C. Is its acceleration positive or negative? neg
   D. Is its displacement positive or negative? pos

5. An object moves 50 m to the left after starting at rest. If it ends up going 12 m/s to the left, for how long did it accelerate?

   Variables: a –, Δx -50m, Vf -12m/s, Vi 0m/s, t ?

   What's Variable is not used? a

   What equation will you use? $\Delta x = \frac{1}{2}(V_i + V_f)t$

   $-50m = \frac{1}{2}(0m/s + -12m/s)t$

   Solve: $-50 = -6t$, $t = 8.3$ sec

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?

   Variables: a 3m/s², Δx ?, Vf –, Vi 6m/s, t 4s

   What's Variable is not used? Vf

   What equation will you use? $\Delta x = (V_i t) + (\frac{1}{2} a t^2)$

   $\Delta x = (6m/s \cdot 4s) + \frac{1}{2}\, 3m/s^2 (4s)^2$

   Solve: $\Delta x = 24 + 24$, $\Delta x = 48$ m

7. 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?

   Variables: a –, Δx -112m, Vf ?, Vi 0m/s, t 14s

   What's Variable is not used? a

   What equation will you use? $\Delta x = \frac{1}{2}(V_i + V_f)t$

   $-112m = \frac{1}{2}(0 + V_f)14s$

   Solve: $\frac{-112}{7} = \frac{7V_f}{7}$, $V_f = -16$ m/s

From the "Freefall" notes:

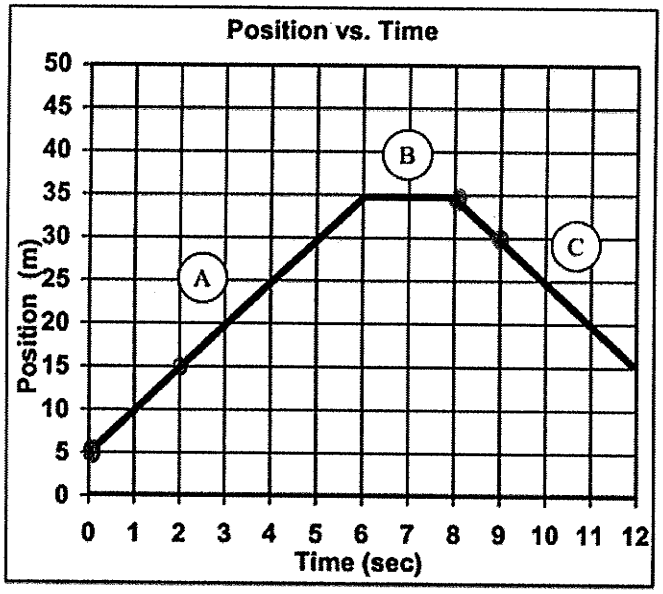
8. When an object is dropped or thrown, what is its acceleration? $g = -9.8 m/s^2$

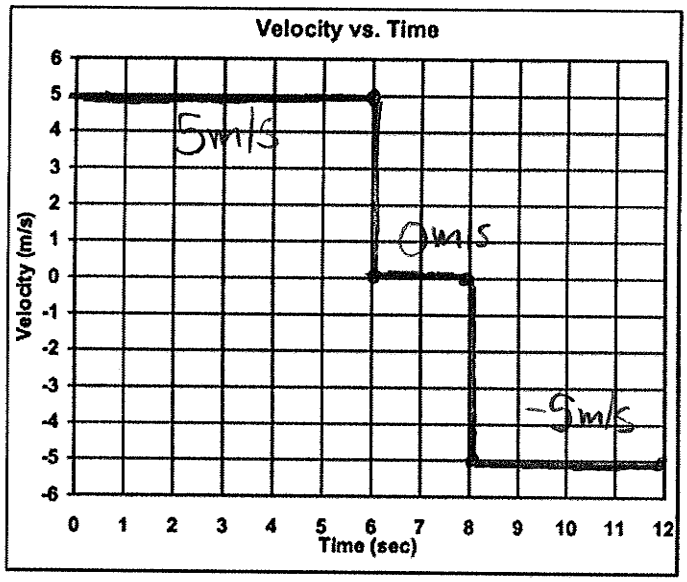
9. An object is dropped from 18 m in the air.
   A. What is its initial velocity? 0m/s
   B. What is its displacement? -18m

10. 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? 0m/s

Also from the "Freefall" notes:

11. A ball is thrown from the ground going 12 m/s. It lands back on the ground.
    A. What is the acceleration of the ball during its flight? $-9.8\ m/s^2$
    B. Since it comes back to the ground, what is Δy? 0m
    C. What will be its final velocity just before it hits the ground? $-12\ m/s$





Use the graphs to answer the following:

12. A. What is the velocity of line A above?
    (Hint: slope) $\frac{\Delta Y}{\Delta X}$ $\frac{15m-5m}{2s} = \frac{10m}{2s}$ 5 m/s

    B. What is the velocity of line B above?
    0 m/s

    C. What is the velocity of line C above?
    $\frac{\Delta Y}{\Delta X}$ $\frac{30m-35m}{1s}$ $\frac{-5m}{5}$

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

    E. Figure out the acceleration of each of the lines on the velocity graph.
    no ΔV for any of them

    F. Transfer these three lines to the acceleration graph.