<u>Unit 2: One-Dimensional Motion.</u>

<u>Pre-test Guide to questions 1-35</u>.

Remember that you must review all questions prior to the test to ensure that you will be able to complete the test on time. Each question counts the same, 2pts each, so don't spend too much time on any one question. When reviewing, try to duplicate classroom setting with no music, cell phone, food or other distractions. This will greatly help you prepare for the test.

1. (C) Review the definition of distance and displacement.
2. (C) Review the definition of average velocity and instantaneous velocity
3. (D) The unit identifies acceleration of m/s every second. A positive acceleration in the positive direction indicates speed is increasing every second. If opposite, it would be decelerating.
4. (A) Car is moving in the "neg" direction and begins to decelerate. Deceleration is opposite to the motion, the acceleration must be positive, which is opposite to the motion of the car.
5. (C) Gravity is always constant, (okay when relatively close to the earth), and if an object is thrown upward, up can be defined as negative with down defined as positive, therefore the rock goes up with a negative velocity, slows when reaching its apex and reverses to come back down, but gravity remained constantly 9.8 m/s^2 throughout.
6. (D) Yes, a car with its gas pedal pushed to the floor. Car accelerates quickly to begin but then levels off when friction forces begin to oppose engine forces, slowing the acceleration. A falling object experiences the same effect and eventually reaches "terminal velocity".
7. (B) Calculate final speed of both objects. $V_0 = 0$ m/s $V_f = ?$ use any acceleration once and find "t", then do again with another acceleration that is double the first, and find "t", then compare. Use formula $V_f = V_0 + at$
8. (D) Same as the previous problem but calculate distance "d" instead of time "t". Use formula $V_f^2 = V_0^2 + 2as$
9. (B) Review section _____ in our book.
10. (A) To do this calculation quickly, remember the height up equal's height going down. Also remember the final velocity going down equal's initial velocity going up. Pick any speed, start from the top where $V_0 = 0$ m/s and now the final speed is the same as the speed thrown up. Calculate once with speed "v" and again with speed "2v". Calculate "d" in each case and compare.
11. (C) Should be the same, since both are thrown at the same speed, but one up and the other down. The one going up will eventually come back down with the same speed and match the one being thrown down. The one thrown up will take longer to hit the ground but will hit with the same speed as the one thrown down.
12. (C) Gravity is the same for both bricks, the one thrown will have a faster final velocity, if we neglect air resistance.
13. (D) non-zero acceleration can be any acceleration (positive or negative) other than zero. Evaluate your notes on the graphs we did in class. Correct one should show a uniform increase in velocity (slope).
14. (A) non-zero velocity can be any velocity (positive or negative) other than zero. Evaluate your notes on the graphs we did in class. Should be horizontal line.
15. (B) Remember slope is Rise over Run ($\Delta Y / \Delta X$) assuming "y" is vertical and "x" is horizontal.
16. (C) A position verses time graph show velocity in the slope, therefore a horizontal line has no slope and thus no velocity, i.e. at rest.
17. (D) Draw a simple diagram showing boat moving to right or left with an arrow at 30 km/hr. Then draw another arrow going in the opposite direction. Find the "net" force, which is the difference between the two, i.e. 24 km/hr. NOW do the calculation with the velocity average being 24 m/s and distance being 12 km, solve for time. Use $V = d/t$ formula.

18. (A) Do the dimensional analysis with the given information.
19. (D) 90 km/h is the average velocity, 400 km is the distance or displacement. Use $V = d/t$
20. (D) Careful, the word "velocity" indicates displacement. Therefore equals zero, since it returns to where it started.
21. (B) Draw this out on scrap paper. Two segments. First segment is V_{ave} = 55 mi/h for 110 mi thus you spend 2 hours in this segment. Next segment, take total time 4.25 hours (4 hr 15 min) minus 2 hours (first segment), leaving 2.25 hours. Now calculate distance in second segment $d = V_{ave} \times$ time : add this to 110 miles in first segment to get answer. Round to the closest answer.
22. (B) Use the G.U.E.S.S. method to solve.
23. (D) Use the G.U.E.S.S. method to solve. WATCH OUT for units!!!
24. (C) Use the G.U.E.S.S. method, watch for terms (decelerate means negative acceleration!)
25. (A) Use the G.U.E.S.S. method, watch for units. Notice all answers are negative! Must be decelerating!
26. (C) Use the G.U.E.S.S. method.
27. (B) Remember, once it leaves your hand, you no longer accelerate the object, and since it is falling in the field of gravity, gravity takes over, which is constant.
28. (A) Remember the easy way to calculate?! Start from the top and go down. The initial velocity will be the same as the final velocity, therefore $V_0 = 0$ m/s, $a = 1.5$ m/s^2, and final velocity = 12 m/s. Assuming down is positive and up is negative! Now use the G.U.E.S.S. method to find answer.
29. (B) We don't know how high it goes, unless you want to find out (waste of time!) Define up/down. Up = neg ; Down = pos. Use G.U.E.S.S to find answer. i.e. $V_0 = -14$ m/s : $a = 3.5$ m/s^2 , t = 8 sec (always positive since it is a scalar value) , V_f = ?
30. (B) Same as previous problem, but you must assume on earth this time as it does not specify.
31. (C) Draw this out. Remember time up plus time down equals 10 sec. So label time up = 5 sec and time down = 5 sec. Start from the top (easiest way) with $V_0 = 0$ m/s : $a = 9.8$ m/s^2 : t= 5 sec : V_f = ?. Solve with the G.U.E.S.S. method.
32. (D) Analyze the graph for the next four questions. It is a velocity vs. time graph. Slope indicates acceleration. Area under the graph indicates the objects displacement. For 1 second, find the slope at this point. Rise / run. Line segment 0 m/s to 20 m/s is constant, therefore find this slope to find it for 1 second, it will be the same as the line is constant slope.
33. (A) Same as previous question.
34. (B) Tricky, but not hard. Since 0-5 seconds covers three segments, be careful what you are looking at. The formula for average acceleration is $a_{ave} = (\Delta V / \Delta t)$ average acceleration = change in velocity / change in time. Object starts $V_0 = 0$ m/s and eventually attains a speed of 10 m/s. Look at the graph, it is not a negative value, even though the slope at 5 seconds is negative. This just means that it is decelerating, not reversing direction. It reverses direction once the line goes below the axis.
35. (C) Calculate the area under the graph between 0-6 seconds and again between 6-8 seconds. Subtract the area between 6-8 seconds from 0-6 seconds to find the total distance traveled. Remember the area under a velocity vs. time graph is indicative of an objects total displacement. Another way to view this is to calculate the distance in each segment, i.e. between 0-2 sec = + 20 m: 2-4 sec = +40 m: 4-6 = +20 m: 6-8 sec = -20 m: All together the object traveled 20 m + 40 m + 20 m – 20 m = 60 m.

Bonus: Good Luck. No hints as this is a take home. I did give the answer for this one, but won't be giving the answers out in future bonus questions. So this one is easier! ☺☺