Welcome to day 1 of independent learning. I'm not sure how well this is going to work, but let's just take things one day at a time.

Motion

1. Speed Increasing = a(t) and v(t) have same sign
   Speed Decreasing = a(t) and v(t) have different signs

Solve by a(t) and v(t) = 0 and plot results on the same number line. You can tests values to see if they are positive or negative. Or you can remember that sign will change at every zero unless it is a double root, which is not common.

2. Total Distance on t = [a, b], $\int_a^b |v(t)|dt$

Remember how to do an absolute value on your calculator. If the function is given as a graph, make sure you make any negative values into positive values.

3. Displacement on t = [a, b], $\int_a^b v(t)dt$

4. Position at t = b with an initial condition given at t = a

Position = $x(a) + \int_a^b v(t)dt$

5. Change of direction at any time t where $v(t) = 0$ and sign change

General guidelines

There are four different ways that functions can be given:
1. Equation that requires a graphing calculator
2. Equation that does not require a graphing calculator
3. Table of values (need approximation skills – approximate rate of change = slope, approximate integral requires rectangles or trapezoids.
4. Graph – rate of change = slope, integral values require geometry area. Make sure you include any initial condition and watch out for your signs. Integrate left to right (from a lower value to a higher value) reverses the signs.

Classwork Problem 1

This is a straightforward calculator based problem that addresses most of the 5 issues listed above.

Classwork Problem 2

This problem has similar questions to problem 1, but is a no calculator problem. Be careful when integrating and differentiating to remember the chain rule and u-substitution. You need to account for the constant inside of the given sin function.

Classwork Problem 3

This problem has a velocity function given as a graph, so no calculator is allowed. It includes an optimization question in part b. Remember to compare all critical points and endpoints. Part d is challenging. You need to find functions for a(t), v(t) and x(t). Remember that x(t) will require an initial condition and that your integral setup needs to have t as a limit of integration since the answer is a function. You need to actually do the integral (easy integration with a linear function) and plug in t.

Classwork Problem 4

This problem has a velocity function as a table and then another velocity function that you can handle without a calculator. The questions are straightforward, but you need to remember how to do your change and integration approximations.

The answers to these four problems are posted, but please attempt them on your own before going the answers. Once you feel like you have a solid understanding of these problems, then you can attempt the homework problems. If you have any questions, you can ask via email or by replying to Aeries communication post.

If you are preparing for the AP exam, you should try to complete these problems and the homework over the next two days.

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