

Supplement 3-4 Review

This review is not all inclusive. You are expected to know how to do all the problems in the homework.

Reference Lines

1. Overall Rate of Change Questions (ATS):
 - (a) If you are asked 'Find the overall rate of change at $t = 10$ ', then you draw the secant line that goes through the graph at $t = 0$ and $t = 10$ and you find the slope. (If the line goes through the origin, we also call it a diagonal line).
 - (b) If you are asked 'Find the time when the overall rate of change is 5 units per minute', then you need to draw a **reference line** that has a slope of 5 and find the corresponding time.
 - (c) NOTE: To draw a line with slope 5, start with the point $(0,0)$. To get another point, pick an x -value and multiply by 5 to get the y -value. That is, at $x = 30$ the y value is 150. So you would draw a line through $(0,0)$ and $(30,150)$.
2. Incremental Rate of Change Questions (AS):
 - (a) If you are asked 'Find the incremental rate of change from $t = 10$ to $t = 20$ ', then you draw a secant line through the graph at $t = 10$ and $t = 20$ and you find the slope.
 - (b) If you are asked 'Find a 10-minute interval where incremental rate of change is 8 units per minute', then you need to draw a **reference line** that has a slope of 8. Then you need to 'roll', or 'slide', your ruler to **find a 10-minute interval that has a secant line with a parallel slope**.
3. Change in the Value Questions:
 - (a) If you are asked 'Find the change in height from $t = 4$ to $t = 9$ ', then you approximate how much the graph has gone up (or down) from $t = 4$ to $t = 8$.
 - (b) If you are asked 'Find a 5-minute interval where the change in height is 50', then you have a couple options.
 - i. Option 1 (the long way): At various 5-minute intervals approximate the change in height. If it is close to 50, then try moving your interval slightly until you get the right answer. (This is tedious and imprecise, but it can work).
 - ii. Option 2 (the better way): Turn it into a slope problem. Over 5 and up 50 is the same as saying there is a slope of $\frac{50}{5} = 10$. So you are looking for a 5-minute interval where the slope is 10. Now you can use the reference line technique discussed above for incremental rates of change.

Homework Notes: Make sure to read the graphs carefully in the homework. The main concepts so far are the ones discuss above and in the previous review sheet, but we also are testing you on your ability to read graphs carefully. If the graph given is a total distance, or total temperature, or total amount of cars, or total amount of water, etc.. then you use the above techniques to find rates. BUT if the graph given is already the rates, then you are just reading values off of the graph and using the formulas. You need to read carefully. I always suggest that student first make a table using a few values from the graph just to make sure they understand what is going on. See the homework comments and hints for more specific examples and advice.