hey

3.1 Lesson Notes
(Materials Needed: graph paper)

How Fast Did You Lose?

You are a member of a health and fitness club. The club's registered dietitian and your personal trainer helped you develop a special eight-week diet and exercise program. The data in the following table represents your weight, w, as a function of time, t, over an eight-week period.

x	**TIME** (weeks)	0	1	2	3	4	5	6	7	8
y	**WEIGHT** (lb)	140	136	133	131	130	127	127	130	126
			-4	-3	-2	-1	-3	-0	+3	-4

x y

Plot the data points using ordered pairs of the form (t, w). For example, (3, 131) is a data point that represents your weight at the end of the third week.

WITH A PARTNER:

1. Compare graphs and address any discrepancies.
2. What is the practical domain and range of this function?

   x y

   D: $0 \leq x \leq 8$ R: $120 \leq y \leq 140$

3. What was your weight at the beginning of the program?

   140 lbs.

4. What was your weight at the end of the first week?

   136 lbs.

5. To see how the health program is working for you, you analyze your weekly weight changes during the eight-week period.

   a. During which week(s) does your weight increase? weeks 6 & 7

   b. During which week(s) does your weight decrease? weeks 0-5 and 7-8

   c. During which week(s) does your weight remain unchanged? btw. weeks 5 & 6

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AVERAGE WEIGHT OF CHANGE:

1. Determine the actual change in your weight over the first five weeks of the program by subtracting your initial weight from your weight at the end of the first five weeks.

140 lbs. − 127 lbs. = 13 lbs.

2. What is the sign (positive or negative) of your answer? What is the significance of this sign?

negative b/c weight is decreasing

3. Determine the change in the t-value over the first five weeks; that is, from t = 0 to t = 5.

5 weeks

4. Write the ratio of the change in weight from #1 to the change in time in #3. Interpret the meaning of this ratio.

$$\frac{-13 \text{ lbs}}{5 \text{ weeks}} = -2.6 \text{ lb/week}$$

This is called the AVERAGE RATE OF CHANGE. What do you know about average rate of change? Is there a formula you are familiar with? Write it below.

$$\frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

GRAPHICAL INTERPRETATION of the AVERAGE RATE OF CHANGE.

1a. On your graph, connect the points (0, 140) to (5, 127) with a line segment. Does the line segment rise, fall, or remain horizontal as you follow it from left to right?

fall

1b. Recall that the average rate of change over the first five weeks was-2.6 pounds per week. What does the average rate of change tell you about the line segment drawn in the previous question.

its a negative slope line w/ a slope of -2.6

2a. Determine the average rate of change of your weight over the time period from t =5 to t = 7 weeks. Include the appropriate sign and units.

$$\frac{\Delta y}{\Delta x} = \frac{130 - 127}{7 - 5} = \frac{3}{2} = 1.5 \text{ lb/wk}$$

2b. Interpret the rate in part a with respect to your diet.

gained 1.5 lb/week during that period of time