

## 1.2 Notes: Line of Best Fit

### BUILD YOUR VOCABULARY:

Line of Best Fit (or "trend" line): a straight line that best represents the data on a scatterplot. The line may pass through some of the points, none of the points, or All of the points.

**Example:** Is there a relationship between the fat grams and the total calories in fast food?

Sandwich	Total Fat (g) <i>X</i>	Total Calories <i>Y</i>
Hamburger	9	260
Cheeseburger	13	320
Quarter Pounder	21	420
Quarter Pounder with Cheese	30	530
Big Mac	31	560
Arch Sandwich Special	31	550
Arch Special with Bacon	34	590
Crispy Chicken	25	500
Fish Fillet	28	560
Grilled Chicken	20	440
Grilled Chicken Light	5	300

### Paper and Pencil Solution:

Can we predict the number of total calories based upon the total fat grams?

1. Prepare a scatter plot of the data on graph paper.
2. Using a strand of spaghetti, position the spaghetti so that the plotted points are as close to the strand as possible.
3. Find two points that you think will be on the "best fit" line. *(points may be different for each individual)*

## 1.2 Notes: Line of Best Fit

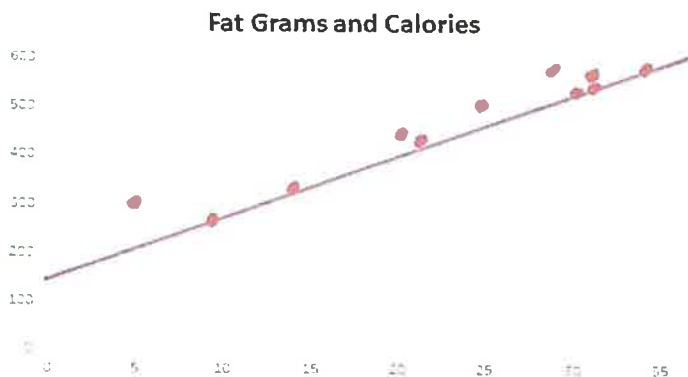
4. Calculate the slope ( $m$ ) of the line through your two points (rounded to two decimal places) by using the point slope form ( $y - y_1 = m(x - x_1)$ ). It may be helpful to use the slope formula:  $\frac{y_2 - y_1}{x_2 - x_1}$

$(9, 260)$   $(30, 530)$

$$m = \frac{530 - 260}{30 - 9} = \frac{270}{21} = 12.86$$

$$y - 260 = 12.86(x - 9)$$

$$y = 12.86(x - 9) + 260$$



5. Write the equation of the line.

$$y = 12.86x + 144.26$$

6. This equation can now be used to predict information that was not plotted in the scatter plot.

Question : Predict the total calories based upon 22 grams of fat.

427.18 calories

$$y = 12.86(22) + 144.26$$

### So, what is the REAL "line of best fit?"

To answer this, we will need the assistance of a TI-84 Plus graphing calculator:

Can we predict the number of total calories based upon the total fat grams?

<p>1. Enter the data in the calculator lists. Place the data in <math>L_1</math> and <math>L_2</math></p> <p><math>L_1 = x</math> list <math>L_2 = y</math> list</p>	<p>STAT <math>\Rightarrow</math> Edit <math>\Rightarrow</math> Type values into the lists</p>
<p>2. Prepare a scatter plot of the data. Set up for the scatter plot.</p>	<p>2nd STAT PLOT <math>\Rightarrow</math> Enter Enter Zoom #9 (Zoom STAT) <math>\Rightarrow</math> ENTER</p>
<p>3. Have the calculator determine the line of best fit. Slope <math>\rightarrow a = 11.73</math> <math>y</math>-int <math>\rightarrow b = 193.85</math></p> <p>*Write your equation <math>y = 11.73x + 193.85</math></p>	<p>STAT <math>\Rightarrow</math> CALC <math>\Rightarrow</math> LinReg (#4) Click ENTER through the list <math>y = ax + b</math> <math>a =</math> slope <math>b =</math> y-intercept</p>
<p>4. Graph the line of best fit.</p> <p>How many calories for 19 fat grams? <u>416.72</u></p>	<p><math>Y =</math> (enter equation from #3 in <math>Y_1</math>) GRAPH TRACE (to get the desired value click up arrow, type in value and click ENTER)</p>