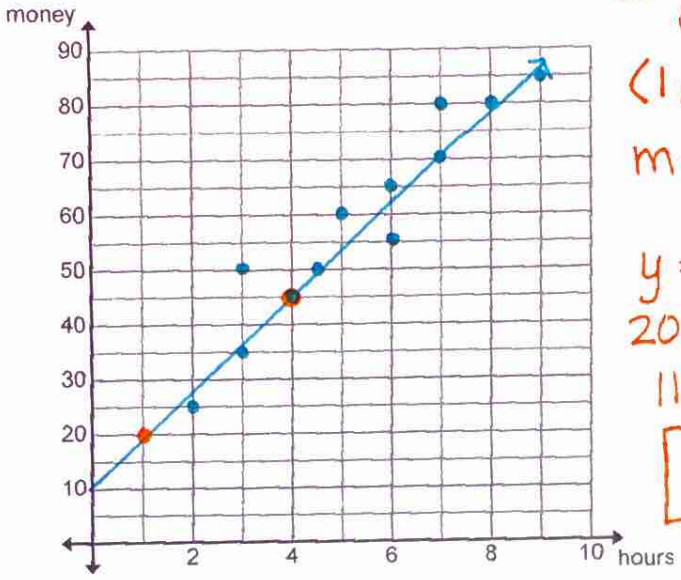
Residuals Class Example

1. Given the following x & y make a scatter plot and find a BFL equation.

Name	x (# of Hours)	y (Money Earned)
Sam	4	$45.00
John	7	$80.00
Amy	3	$50.00
Nathan	6	$55.00
Melissa	4.5	$50.00
Rachel	8	$80.00
Alex	7	$70.00
Tyler	5	$60.00
Tom	6	$65.00
Kerry	2	$25.00
Becky	3	$35.00
Kyle	9	$85.00



① scatter plot

② BFL

eg. BFL

$(1,20)$ & $(4,45)$

$m = \frac{45-20}{4-1} = \frac{25}{3} = 8.3$

$y = 8.3x + b$

$20 = 8.3(1) + b$

$11.7 = b$

$\hat{y} = 8.3x + 11.7$

2. Now we are going to fill out the chart further to make a residual plot.

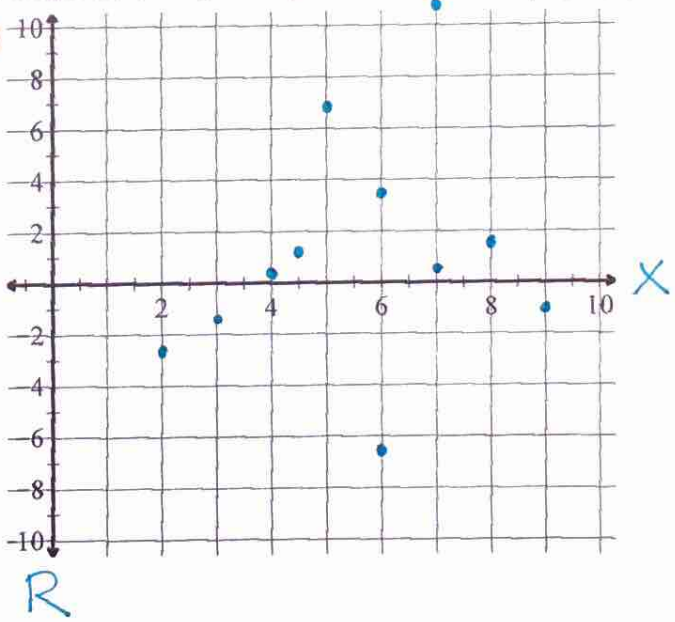
plug x in

③

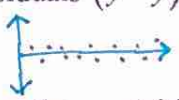
Name	x (# of Hours)	y (Money Earned)	$\hat{y}$ (Use BFL)	$y-\hat{y}$ R
Sam	4	$45.00	44.9	0.1
John	7	$80.00	69.8	10.2
Amy	3	$50.00	36.6	13.4
Nathan	6	$55.00	61.5	-6.5
Melissa	4.5	$50.00	49.03	1
Rachel	8	$80.00	78.1	1.9
Alex	7	$70.00	69.8	0.2
Tyler	5	$60.00	53.2	6.8
Tom	6	$65.00	61.5	3.5
Kerry	2	$25.00	28.3	-3.3
Becky	3	$35.00	36.6	-1.6
Kyle	9	$85.00	86.4	-1.4

3. Make a scatter plot of points in the form $(x, y-\hat{y})$.

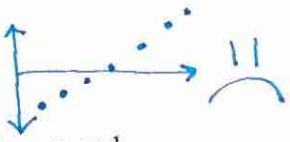
④



- If the Line of Best Fit is a good fit for the data, then the ~~absolute~~ value of the residuals $(y-\hat{y})$ are relatively small and approximately evenly distributed above and below the $x-$axis.



- If the residuals are mostly positive (above the $x-$axis) or mostly negative (below the $x-$axis), then the line is in the wrong place.
- If the residual plot is steadily increasing or steadily decreasing, then the data is not linear!



- If the residual plot is scattered all over the place, then there probably is no correlation between x and y.