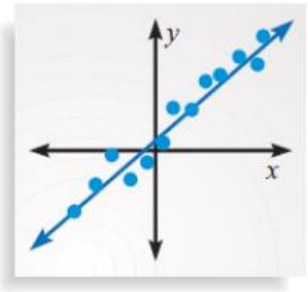
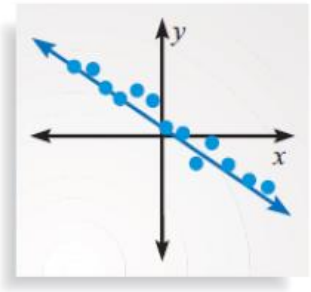
Tone-Up Tuesday #5 Name: _____

Best Fit Line Due Date: 3/31/15 Problems per night: 1

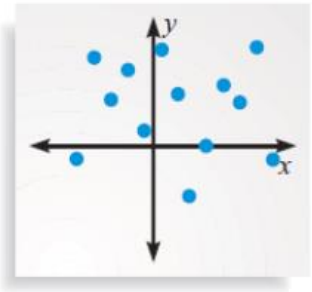
IMPORTANT RULES:



Positive correlation



Negative correlation



Relatively no correlation

Note: It is important to understand that if two variables are strongly correlated, it is not necessarily try that a change in one variable "causes" a change in the other. Often changes in both variables result from a common "cause." For example, shoe size and reading ability of school children are positively correlated because increases in both these variables come with increased age. However, having large feet does not "cause" increased reading ability.

Use a graphing calculator to find a best-fitting line to data.

Step 1	Enter the data into the STAT EDIT L1 and L2. • Enter the first coordinate of all of the ordered pairs into L1 and the second coordinate into L2.
Step 2	Use the scatter plot graph option to determine the relationship between the data. • Turn off all statistical plots by entering 2nd STAT PLOT 4:PLOTS OFF • Clear all equations from the y = menu • Go to STAT PLOT, Choose Plot 1 • Turn it On. Choose the first icon in row "Type" which represents the scatter plot. Select L1 for Xlist and L2 for YList and choose a mark. • To see this graph, we first set the window to ZOOM STAT and then GRAPH.
Step 3	To find the Line of Best Fit, we use the linear regression feature on the calculator. • Go to STAT CALC and choose LIN REG(ax + b) • Hit Enter and then add L1 (2nd #1 Key) comma L2 (2nd #2 Key) • Hit enter *The "a" value is the slope of your line of best fit* *The "b" value is the y-intercept* *The "r" value is called the correlation coefficient. This is a measure of the quality of the linear model. The closer the r value is to 1 or -1, the stronger the relationship.*
Step 4	Putting the regression equation (Line of Best Fit) onto your graph. • Go to y = • Go to VARS STATISTICS • Go to EQ, REGEQ • Hit Enter. Your calculator enters the equation into y = for you! • Now hit GRAPH and your line will graph on your Scatter Plot.

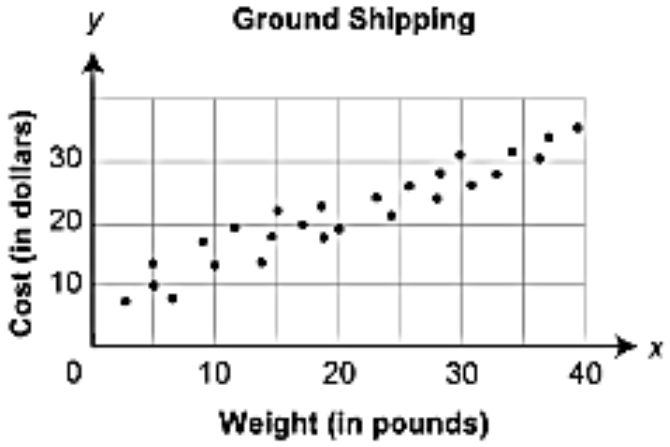
How to find a best-fitting line to data without a graphing calculator.

Step 1	Sketch a line that best fits the data.
Step 2	Choose two points that lie on the line (that are not next to each other) and find the slope of the line using their coordinates.
Step 3	Substitute the slope and one of the ordered pairs into the point-slope form of a linear equation.
Step 4	Re-write the point-slope form into slope-intercept form.

Approximating a Best-Fitting Line

1.

The scatter plot below shows the cost (y) of ground shipping packages from Harrisburg, PA, to Minneapolis, MN, based on the package weight (x).

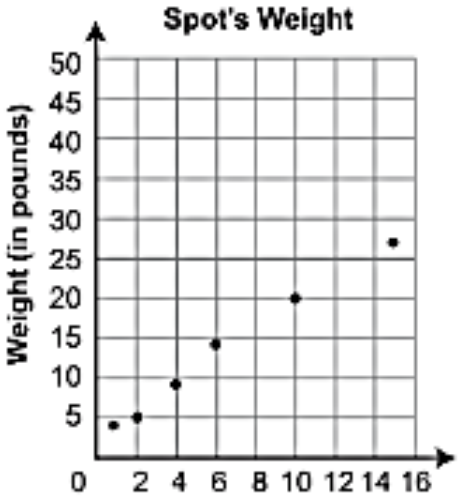


Which equation best describes the line of best fit?

A. $y = 0.37x + 1.57$
B. $y = 0.37x + 10.11$
C. $y = 0.68x + 2.32$
D. $y = 0.68x + 6.61$

2.

John recorded the weight of his dog Spot at different ages as shown in the scatter plot at right.



Based on the line of best fit, what will be Spot's weight after 18 months?

A. 27 pounds
B. 32 pounds
C. 36 pounds
D. 50 pounds

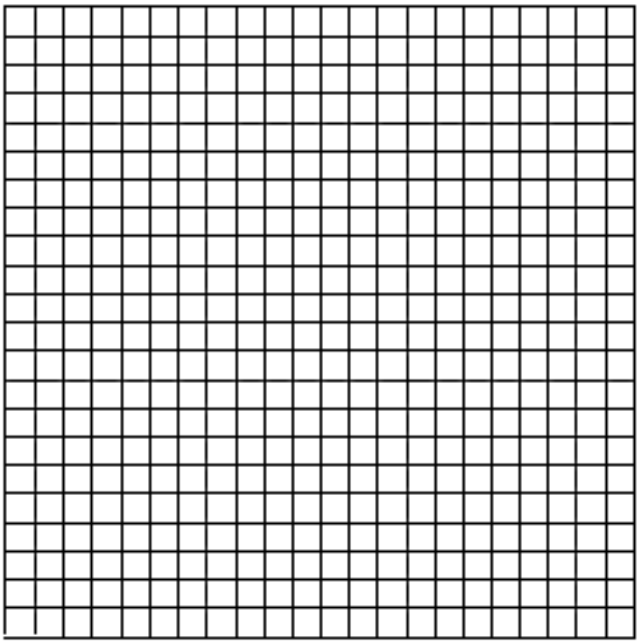
3. The table below gives the number of hours spent studying for a science exam (x) and the final exam grade (y).

X	2	5	1	0	4	2	3
Y	77	92	70	63	90	75	84

a. On the grid provided, create a scatter plot of the data.
b. Draw a line of best fit through the data.
c. Write two ordered pairs that lie on **<u>your line</u>** (grid/lattice points).

d. Determine **the equation of <u>your</u> linear function** using the two ordered pairs from part c.

e. Using your linear function from part d, predict the exam grade of a student who studied for 6 hours.



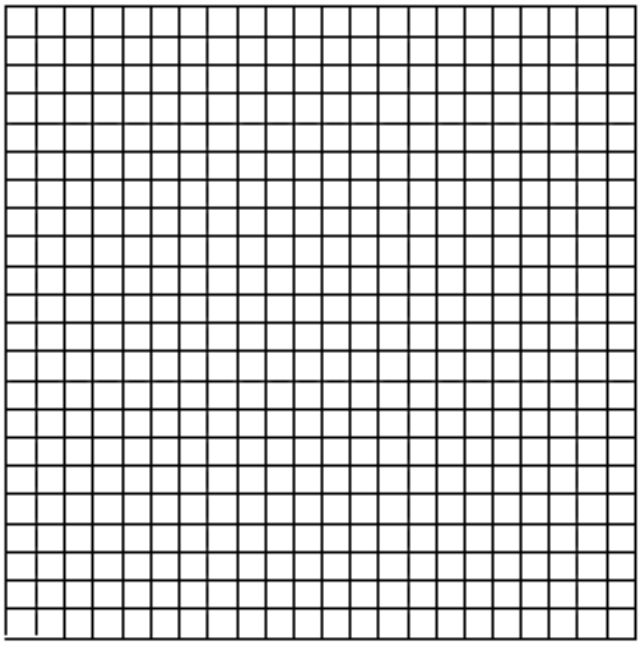
4. The table below gives the lengths and corresponding ideal weights of sand sharks.

Length	60	62	64	66	68	70	72
Weight	105	114	124	131	139	149	158

a. On the grid provided, create a scatter plot of the data.
b. Draw a line of best fit through the data.
c. Write two ordered pairs that lie on **<u>your line</u>** (grid/lattice points).

d. Determine **the equation of <u>your</u> linear function** using the two ordered pairs from part c.

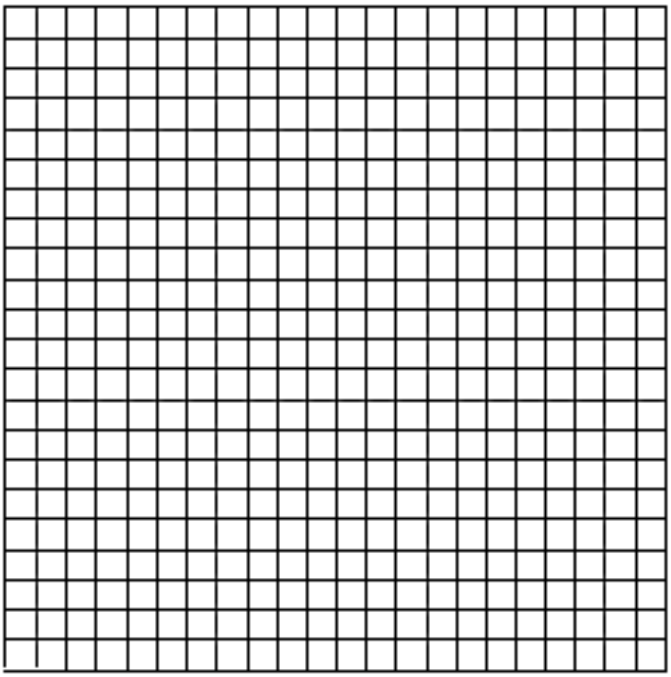
e. Using your linear function from part d, predict the weight of a sand shark whose length is 75 inches.



5. You are studying the way a tadpole turns into a frog. You collect data to make a table that shows the ages and the lengths of the tails of 8 tadpoles.

Age (days)	Length of Tail (mm)
5	14
2	15
9	3
7	8
12	1
10	3
3	12
6	9

Create a scatter plot and find the line of best fit.



Work for Line of Best Fit (if by hand):

***Note**: if you find the line of best fit **by hand**, you must:*

- *Draw the line on your graph*
- *Show work for finding the slope of your drawn line*
- *Write an equation that matches the line you drew*

Equation for Line of Best Fit: _____

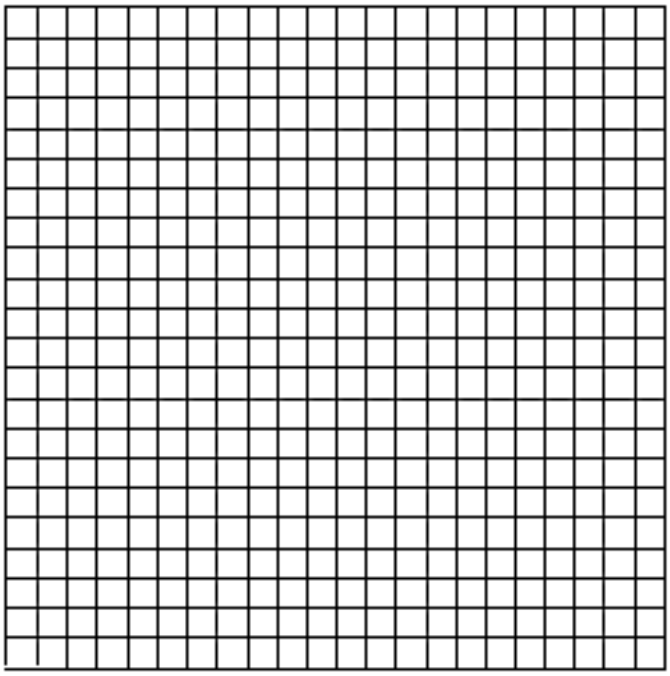
a. What type of correlation (if any) does the data show?

b. Based on the correlation, what can you conclude about the age of the tadpole and the length of the tadpole's tail?

6. The winning Olympics times for the women's 100 meter run from 1948 to 1996 are shown in the table.

Olympic Year	Winning Time
1948	11.9 s
1952	11.5 s
1956	11.5 s
1960	11.0 s
1964	11.4 s
1968	11.0 s
1972	11.1 s
1976	11.1 s
1980	11.1 s
1984	11.0 s
1988	10.5 s
1992	10.8 s
1996	10.9 s

Create a scatter plot and find the line of best fit.



<u>Work for Line of Best Fit (if by hand):</u>

***Note**: if you find the line of best fit **by hand**, you must:*

- *Draw the line on your graph*
- *Show work for finding the slope of your drawn line*
- *Write an equation that matches the line you drew*

Equation for Line of Best Fit: _____

a. What type of correlation (if any) does the data show?

b. Based on the correlation, what can you conclude about the Olympic Year and he Women's 100 meter winning titles?