Algebra 1 Name ______________________

3-6 Analyzing Lines of Fit Date __________________ **A#3**

Goal: To write linear equations that model real world data.

Activity: Is there a relationship between the length one's index finger to the length of one's foot?

Step 1: Carefully measure the length of your right index finger (from the crease to the tip) in centimeters. Then carefully measure the length of your right foot with your shoe off. Record results in the table.

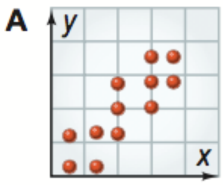
Step 2: Use the graph paper to make a scatter plot of the collected data. Record the finger length values on the horizontal axis and foot length values on the vertical axis.

Length of right index finger (cm)	Length of right foot (cm)

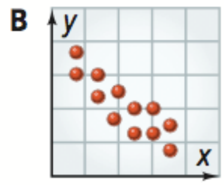
Step 3: Using the ruler, draw a line that goes through the data. This line has a few names: *regression line* or *trend line*. The line that is best is called the *line of best fit*.

Step 4: Pick two points and write an equation in slope-intercept form of the line you drew.

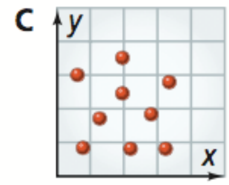
<u>Step 5:</u> Based on the scatter plot above, which of these correlations best describes your graph.



Positive Correlation



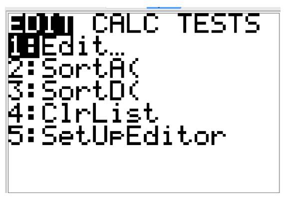
Negative Correlation

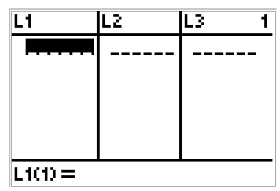


No Correlation

<u>Step 5:</u> Let's graph the data using our graphing calculators.

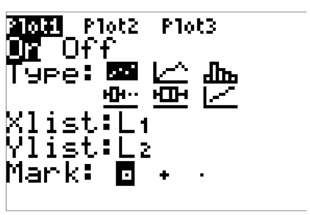
a. Enter data into calculator: STAT→Edit… 

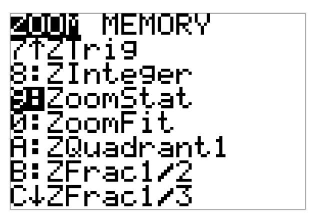




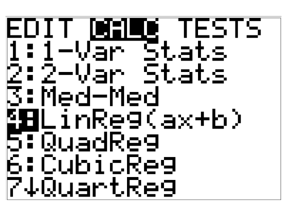
Enter the finger length data into L1 and foot length in L2.

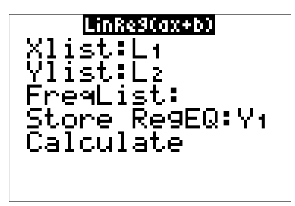
b. View scatterplot: Press STAT PLOT (above Y=). Turn Plot1 On, choose scatter plot, choose L1 as Xlist and L2 as Ylist. Then select GRAPH. If scatterplot does not show up, then select ZOOM→ 9.





c. Graph the *trend line*: Select STAT → CALC → 4: LinReg(ax+b). Choose L1, L2 and Y1 in menu



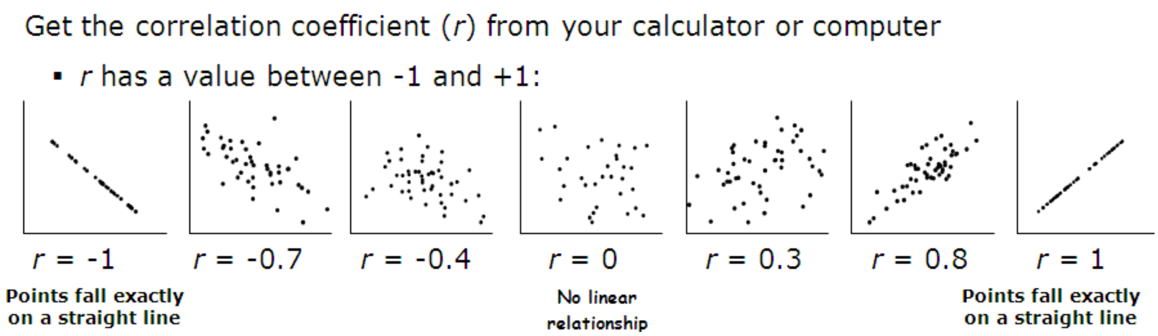


d. $r \approx$ ________________ Y1 = ________________________

e. If your teacher's index finger is 7.5cm long, predict the foot size. __________. Enter Y1(7.5)

Correlation

The line of best fit will have a special number associated with it. This number is called the **correlation coefficient**, *r*. The closer *r* is to -1 or 1, the stronger correlation the data has.



Example: Write the equation of the trend line of the data below. Based on the correlation coefficient, describe the correlation.

a. Example

x	y
1	2.1
3	3.1
5	4
7	5.2
9	5.9

b. Practice

x	y
-2	3.9
-1	1.8
0	0.1
1	-1.9
2	-3.8

Try It! What does each correlation coefficient reveal about the data it describes?

a. $r = 0.1$

b. $r = -0.6$

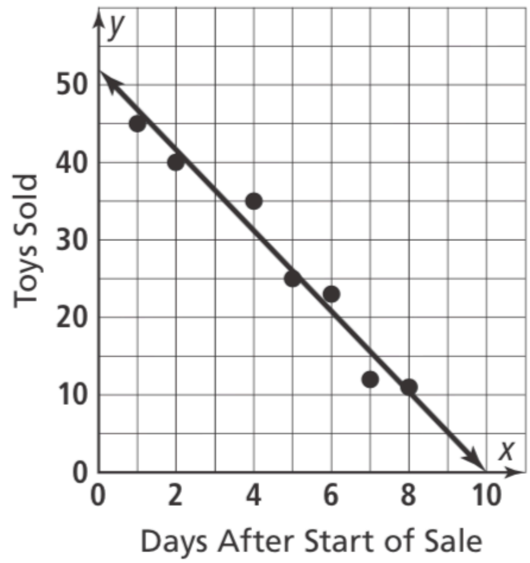
III. How does the line of best fit compare to the actual data?

Algebra 1

3-6 Analyzing Lines of Fit **A#3**

Hafiz collected data on the number of toys sold at his uncle's shop during the Great Toy Sale of 2019.

a. Approximate how many toys were sold on day 4? _______
b. How many did the line of fit predict for day 4? ________
c. How far off was the prediction? ___________________________



The difference between the actual value and the predicted is called the ___________

r__________________ = actual - predicted

Try It! What is the residual for day 7? ____

IV. Interpolation and Extrapolation

Linear models are good for ___________________________ (predicting missing data *within* domain) but not for _________________________ (predicting data *beyond* the domain).

Using the model in part D of the activity, choose two finger lengths and predict the foot length:

Interpolation value _____________ yields ____________________________

Extrapolation value _____________ yields ____________________________

V. Causation & Correlation

a. The numbers of books in a home vs GPA of students

b. The number of hours of sleep and grade on a test the next day