

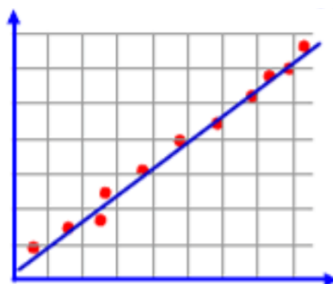
SRHS Math 1 - §4.4b [More about scatterplots, correlation, and lines of fit]

Use the two-quantitative variables applet (on the SRHS Math Webpage for Math 1) to complete graphs and for calculations on this worksheet.

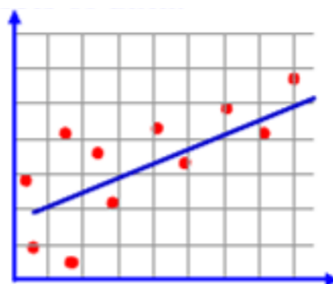
Warm-Up: Is there a correlation between the given variables? If so, is it positive or negative?

1. Shoe Size and Height
2. Hours of Training and Number of Accidents
3. Height and IQ
4. SAT Score and GPA
5. Cigarettes Smoked per Day and Lung Capacity

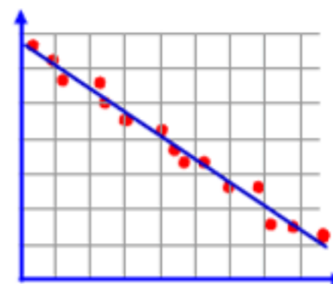
Notes about Correlation: Correlation is an association / connection / relationship between two sets of numbers – the measure of two quantitative variables for each individual in the sample or population. We can estimate the strength of the correlation from a scatterplot. Later we will calculate the measure of the correlation using technology. Here are some examples:



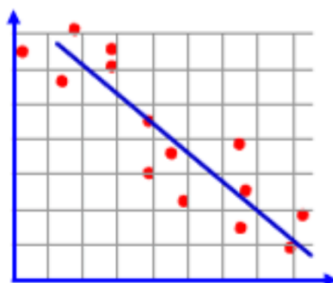
Strong positive correlation



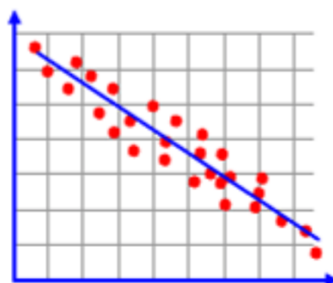
Weak positive correlation



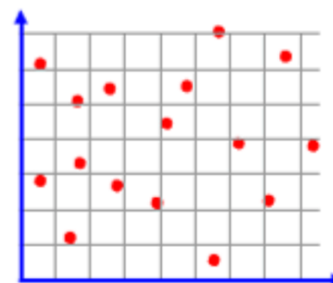
Strong negative correlation



Weak negative correlation



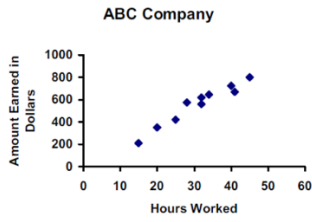
Moderate negative correlation



No correlation

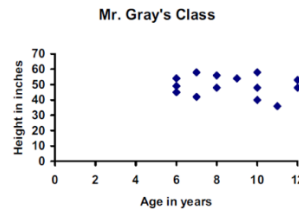
Practice problems:

6. The scatter plot below shows a relationship between hours worked and money earned. Which best describes the relationship between the variables?



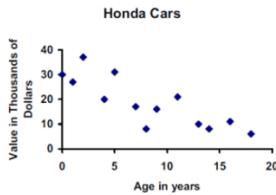
- A) Strong positive correlation
- B) Weak positive correlation
- C) Strong negative correlation
- D) Weak negative correlation

7. This scatter plot shows a relationship between age and height. Which best describes the relationship between the variables?



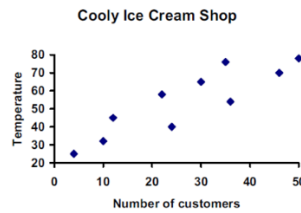
- A) Strong positive correlation
- B) Weak positive correlation
- C) Strong negative correlation
- D) No correlation

8. This scatter plot shows the relationship between the age of a car and its value. Which best describes the relationship between the variables?



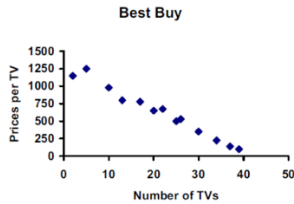
- A) Strong positive correlation
- B) Weak negative correlation
- C) Strong negative correlation
- D) No correlation

9. This scatter plot shows a relationship between the outdoor temperature and number of customers in an ice cream store. Which best describes the relationship between the variables?



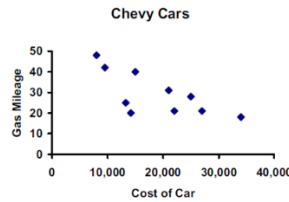
- A) Strong positive correlation
- B) Weak positive correlation
- C) Weak negative correlation
- D) No correlation

10. This scatter plot shows a relationship between the TVs purchased and prices. Which best describes the relationship between the variables?



- A) Strong positive correlation
- B) Weak positive correlation
- C) Strong negative correlation
- D) Weak negative correlation

11. This scatter plot shows a relationship between the cost of Chevy cars and their gas mileage. Which best describes the relationship between the variables?

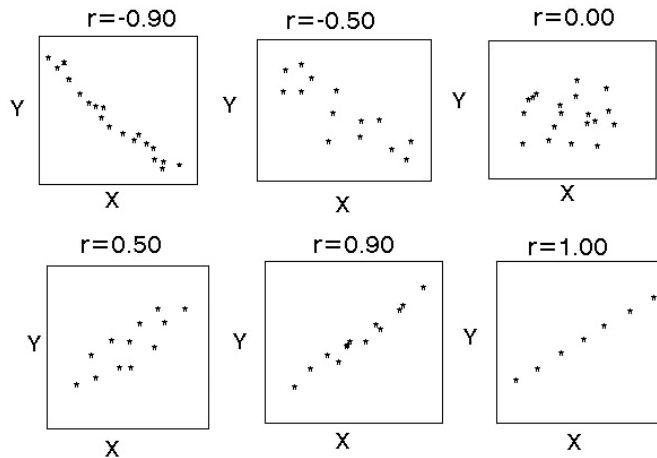


- A) Strong positive correlation
- B) Weak positive correlation
- C) Weak negative correlation
- D) No correlation

12. Create your own example of a positive correlation:

13. Create your own example of a negative correlation:

More notes about **Correlation**: We can be more precise about correlation by using technology to calculate the correlation. We use " r " to represent the correlation. A value of $r = 0$ means there is no correlation and the closer $|r|$ is to 1, the stronger the correlation. If $|r| = 1$ then the data is exactly / perfectly "lined up." Here are some examples:



Notes about a **Line of Fit**: We often want to find a Mathematical Model that represents our data set. In this unit that means finding the equation of a line that fits the data well. We can do that by graphing points and drawing an approximation. We can also use technology to help us find the "Line of Best Fit."

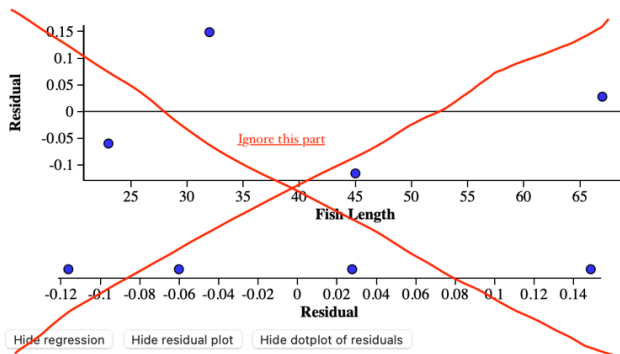
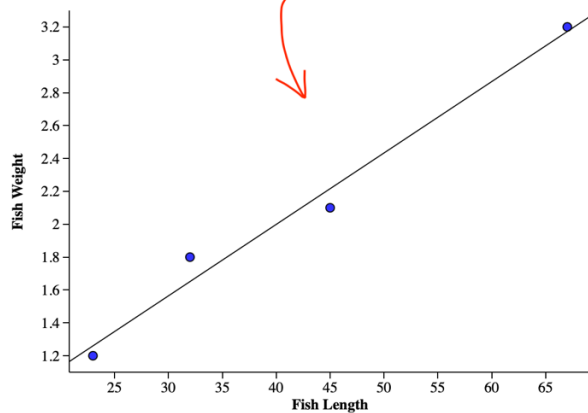
For the remainder of the worksheet, use the "Two Quantitative Variables Statistics Applet" from the Math 1 page of the SRHS Math website. Use the applet to create a scatterplot, calculate the correlation r , and find the equation of the line of best fit. Here's is an example of what you will see for a set of data for the length and weight of fish:

Two Quantitative Variables

Variable	Name	Observations (separated by commas or spaces) <i>Keep individuals in the same order.</i>
Explanatory	Fish Length	23, 32, 45, 67
Response	Fish Weight	1.2, 1.8, 2.1, 3.2

Begin analysis Edit inputs Reset everything

Scatterplot



Calculate Correlation

Calculate correlation $r = 0.99$ ← Here is the correlation, $r = .99$

Regression Models

Calculate least-squares regression line ← Here is your line of best fit, $y = .04x + .26$

Equation	n	s	r^2
$\hat{y} = 0.2607 + 0.0435x$	4	0.141	0.981

For each of the data sets, use the "Two Quantitative Variables Statistics Applet" from the Math 1 page of the SRHS Math website to create a scatterplot, calculate the correlation r , and find the equation of the line of best fit. Quickly sketch your scatter plot below and write r and the equation of the line of fit next to the scatterplot:

17.

Hours Studied	1	2	2	3	4	4	5
Test Score	65	80	73	82	87	90	88

18.

Miles from School	5	8	12	3	3	4	8	10	1
Test Score	85	72	98	97	82	73	68	75	81

19.

Absences	17	0	5	10	18	5	0	0	2	3	6	9	19	18	0	2	3	18	6
Class Grade	73	90	90	92	68	89	94	97	86	100	92	68	71	65	94	89	84	76	63