

Correlation

If two variables have **correlation**, there is a relationship between how one variable reacts to changes in the other variable.

We measure correlation using the correlation coefficient, represented by variable r .

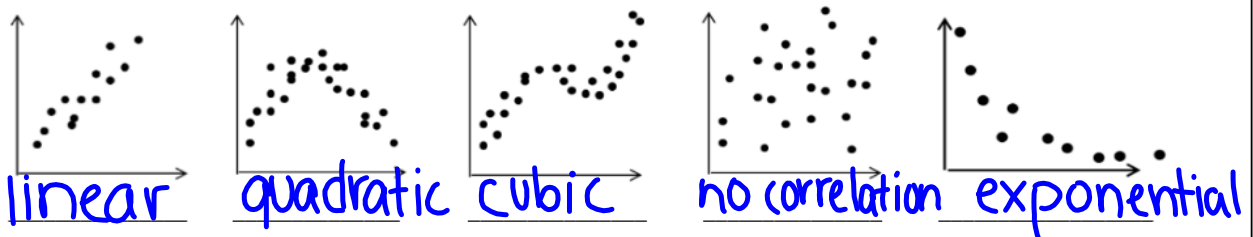
The correlation coefficient, r , is a number between -1 and $+1$.

$$r = 0.937$$

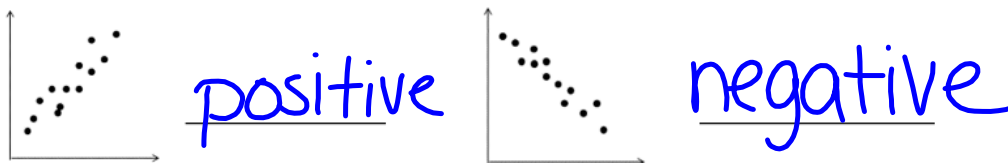
There are 4 traits to describe correlation

1. Form
2. Direction
3. Strength
4. Outliers

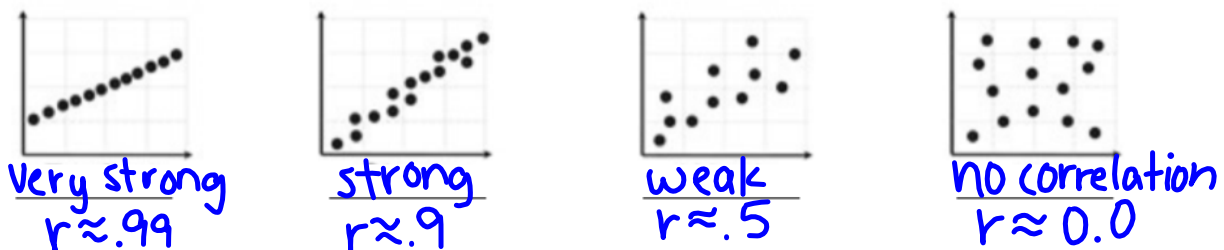
Form – the type of graph the data creates.



Direction – the type of slope of the graph or how the variables relate to each other.



Strength – how closely the two variables are related.



Outliers – data that does not fit with the pattern

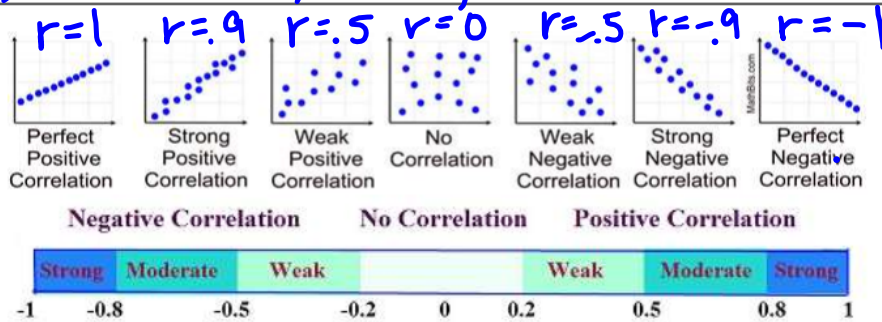


Put the correlation coefficients in order from **weakest** to **strongest**. .04, .32, -.42, .63, -.65

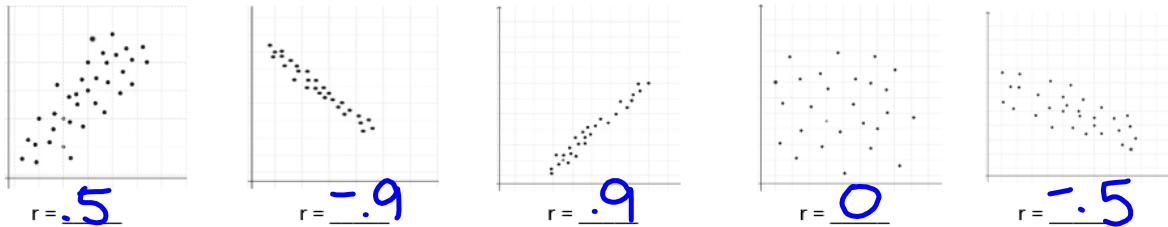
Ex. 1 0.87, -0.81, 0.43, 0.07, -0.98

Ex. 2 0.32, -0.65, 0.63, -0.42, 0.04

0.07, 0.43, -0.81, 0.87, -0.98



Estimate the correlation coefficient for the following graphs.



In the following scenarios, do the variables have a **positive**, **negative**, or **no correlation**?

- a) The number of hours your work vs. The amount of money in your bank account. ↑ positive
- b) The number of hours workers receive safety training vs. The number of job accidents. ↑ negative
- c) The number of students at Wheeler vs. The number of dogs in Atlanta. ↓ no correlation
- d) The number of heaters sold vs. The months in order from January through July. ↑ negative
- e) The number of rice dishes eaten vs. The number of cars on I-75 throughout the day. ↑ no correlation
- f) The number of calories burned vs. The time spent walking. ↑ positive

Although it is easy to find correlation, it is hard to prove **causation**. In order to prove causation, one event must **directly cause** the 2nd event. If this is not the case, it is simply correlation without causation.

For each scenario below, indicate whether it is **ONLY CORRELATION** or **CORRELATION AND CAUSATION**.

Example 1: A recent study showed that college students were more likely to vote than their peers who were not in school.

only correlation

Example 2: Dr. Giles noticed that there was more trash in the hallways after 2nd period than 1st period.

only correlation

Example 3: You hit your little sister and she cries.

correlation AND causation

Example 4: The more television you watch, the worse your grades get.

only correlation