

1. **EXPLANATORY, RESPONSE, ASSOCIATION, OH MY!!** Suppose you were to collect data for each pair of variables. You want to make a scatterplot. For each below, which variable would you use as the explanatory variable and which as the response variable? Why? What would you expect to see in the scatterplot? Discuss the likely direction, form, and strength.

- Long-distance calls:** time (minutes) vs. cost
- Lightning strikes:** distance from lightning vs. time delay of thunder
- Drivers:** reaction time vs. blood alcohol level

2. **HOW WELL WILL YOU DO IN COLLEGE?** The College Board is a membership association composed of schools, colleges, universities, and other educational organizations. One of its better known programs is the administration of the SAT college entrance exam. In a recent study, the College Board wanted to learn what was the best predictor of college grade-point average (GPA) was. The following correlations were obtained based on 48,039 students.

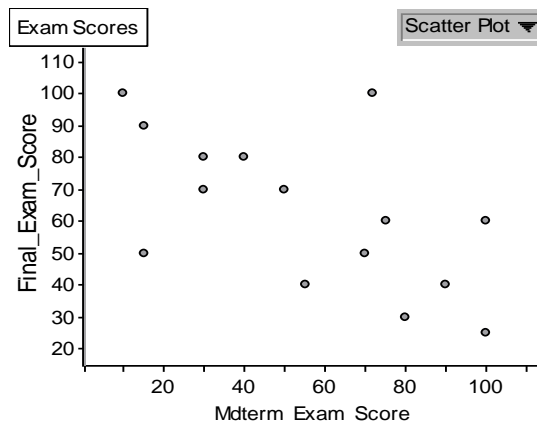
Correlation between College GPA and:	Correlation
SAT score combined with high school GPA	0.61
SAT verbal score	0.47
SAT math score	0.48
SAT combined verbal and math score	0.52
High school GPA	0.54

Source: The College Board

- Which variable is the best predictor of college GPA? Explain.
- Which variable is the worst predictor of college GPA? Explain.

3. Consider the following scatterplot of midterm and final exam scores for a class of 15 students. Which of the following are true statements?

- The same number of students scored 100 on the midterm exam as scored 100 on the final exam.
 - Students who scored higher on the midterm exam tended to score higher on the final exam.
 - The scatterplot shows a moderate negative correlation between midterm and final exam scores.
- I and II
 - I and III
 - II and III
 - I, II, and III
 - None of the above gives the complete set of complete true responses.



4. **THE PROFESSOR WINS** Professor Moore swims 2000 yards regularly in a vain attempt to undo middle age. Here are his times (in minutes) and his pulse rate after swimming (in beats per minute) for 23 sessions in the pool:

Time:	34.12	35.72	34.72	34.05	34.13	35.72	36.17	35.57	35.37
Pulse:	152	124	140	152	146	128	136	144	148
Time:	35.57	35.43	36.05	34.85	34.7	34.75	33.93	34.6	34
Pulse:	144	136	124	148	144	140	156	136	148
Time:	34.35	35.62	35.68	35.28	35.97				
Pulse:	148	132	124	132	139				

- Make a scatterplot. Which is the explanatory variable?
- Is the association between Time and Pulse Rate positive or negative? Explain why you expect the relationship to have this direction.
- Describe the form and the strength of the relationship.
- Find the correlation r . Explain from looking at the scatterplot why this value of r is reasonable.
- Suppose that the times had been recorded in seconds. For example, the time 34.12 minutes would be 2047 seconds. How would the value of r change?

5. **TEACHING AND RESEARCH** A college newspaper interviews a psychologist about student ratings of the teaching of faculty members. The psychologist says, “The evidence indicates that the correlation between research productivity and teaching rating of faculty members is close to zero.” The paper reports this as “Professor McDaniel said that good researchers tend to be poor teachers, and vice versa.” Explain why the paper’s report is wrong. Write a statement in plain language (do not use the word “correlation”) to explain the psychologist’s meaning.

6. **CAN YOU THINK OF A SCATTERPLOT?**

- Draw a scatterplot that has a positive correlation such that when one point is added, the correlation becomes negative. Circle the influential point.
- Draw a scatterplot that has a correlation close to 0 (say less than 0.1) such that when one point is added, the correlation is close to 1 (say greater than 0.9). Circle the influential point.

7. All but one of the following statements contains a blunder. Which statement is correct?

- There is a correlation of 0.54 between the position a football player plays and their weight.
- The correlation between planting rate and yield of corn was found to be $r = 0.23$.
- The correlation between the gas mileage of a car and its weight is $r = 0.71$ MPG.
- We found a high correlation ($r = 1.09$) between the height and age of children.
- We found a correlation of $r = -.63$ between gender and political party preference.

8. A study found correlation $r = 0.61$ between the sex of a worker and his or her income. You conclude that

- Women earn more than men on the average.
- Women earn less than men on average.
- An arithmetic mistake was made; this is not a possible value of r .
- This is nonsense because r makes no sense here.