

1. Metabolic rate, the rate at which the body consumes energy, is important in studies of weight gain, dieting, and exercise. Table 3.2 gives data on the lean body mass and resting metabolic rate for 12 women and 7 men who are subjects in a study of dieting. Lean body mass, given in kilograms, is a person's weight leaving out all fat. Metabolic rate is measured in calories burned per 24 hours, the same calories used to describe the energy content of foods. The researchers believe that lean body mass is an important influence on metabolic rate.

TABLE 3.2 Lean body mass and metabolic rate

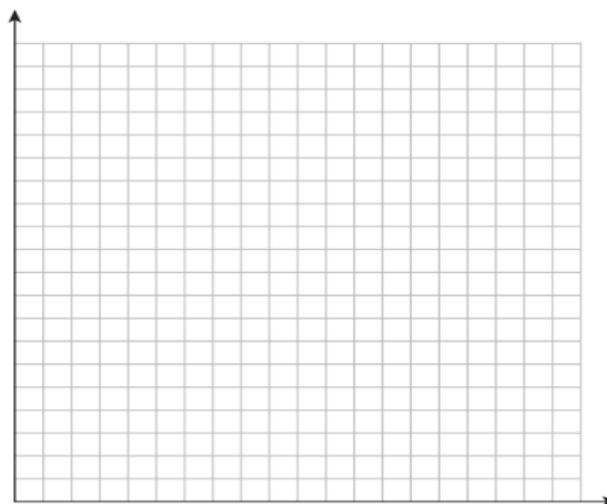
Subject	Sex	Mass (kg)	Rate (cal)	Subject	Sex	Mass (kg)	Rate (cal)
1	M	62.0	1792	11	F	40.3	1189
2	M	62.9	1666	12	F	33.1	913
3	F	36.1	995	13	M	51.9	1460
4	F	54.6	1425	14	F	42.4	1124
5	F	48.5	1396	15	F	34.5	1052
6	F	42.0	1418	16	F	51.1	1347
7	M	47.4	1362	17	F	41.2	1204
8	F	50.6	1502	18	M	51.9	1867
9	F	42.0	1256	19	M	46.9	1439
10	M	48.7	1614				

(a) Make a scatterplot of the data for the female subjects. Which is the explanatory variable?

(b) Is the association between these variables positive or negative? What is the form of the relationship? How strong is the relationship?

(c) Now add the data for the male subjects to your graph, using a different color or a different plotting symbol. Does the pattern of relationship that you observed in (b) hold for men also? How do the male subjects as a group differ from the female subjects as a group?

(d) Calculate the correlation (r) separately for both the female and male data.



2. The math and reading test scores of eleven students are listed below.

a) Find the correlation between these two sets of scores.

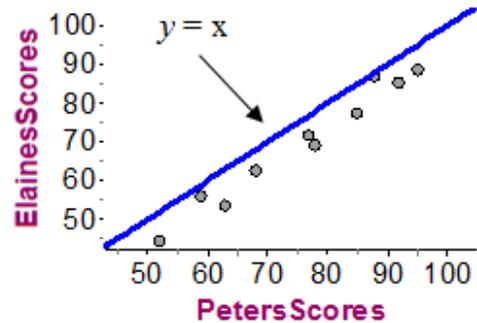
Math score	65	56	32	90	51	51	38	74	50	49	90
Reading Score	85	58	38	10	83	88	43	95	55	68	95

b) One of the students in Question #1 is an outlier. (Make a scatterplot to help you identify the outlier). Delete the math and reading score of the student that is an outlier and recalculate r . Is correlation resistant to outliers?

c) An error was discovered in the math scores. All of the math scores were understated by 5 points. What impact does correcting the math scores have on the correlation calculation?

3. Peter and Elaine are both English teachers at a high school. They decide to grade the same 10 essays and see how their scores compare. The correlation between their scores was $r = 0.98$. The scatterplot below shows the plot of their scores for each essay along with a plot of the line $y = x$.

What can we say about how these two teachers graded these exams? Be specific.



Which teacher would you want to grade your essay? Does it matter?

4. The gas mileage of a car first increases and then decreases as the speed increases. Suppose that this relationship is very regular, as shown in the data below for speed (mph) and mileage (mpg).

Speed	20	30	40	50	60
Mileage	24	28	30	28	24

- Create a scatterplot on your calculator.
- Calculate the correlation value.
- Explain why your correlation has the value found in part (b) even though there is a strong relationship between speed and mileage.

5. Use the hypothetical data in the table below to answer the questions that follow:

x	1	2	3	4	10	10
y	1	3	3	5	1	11

- Create a scatterplot on your calculator.
- Calculate the correlation value.
- What is responsible for reducing the correlation to the value in part (b) despite a strong straight-line relationship between x and y for most of the data?