Unit 6, Lesson 8

Analyzing Bivariate Data

Let's analyze data like a pro.

8.1 Speed vs. Step Length

A researcher found an association between a dog's stride length and its speed: the longer a dog's steps, the faster it goes. The predicted speed in meters per second, s, as a function of step length in meters, l, is

$$s = 4l - 1.6$$

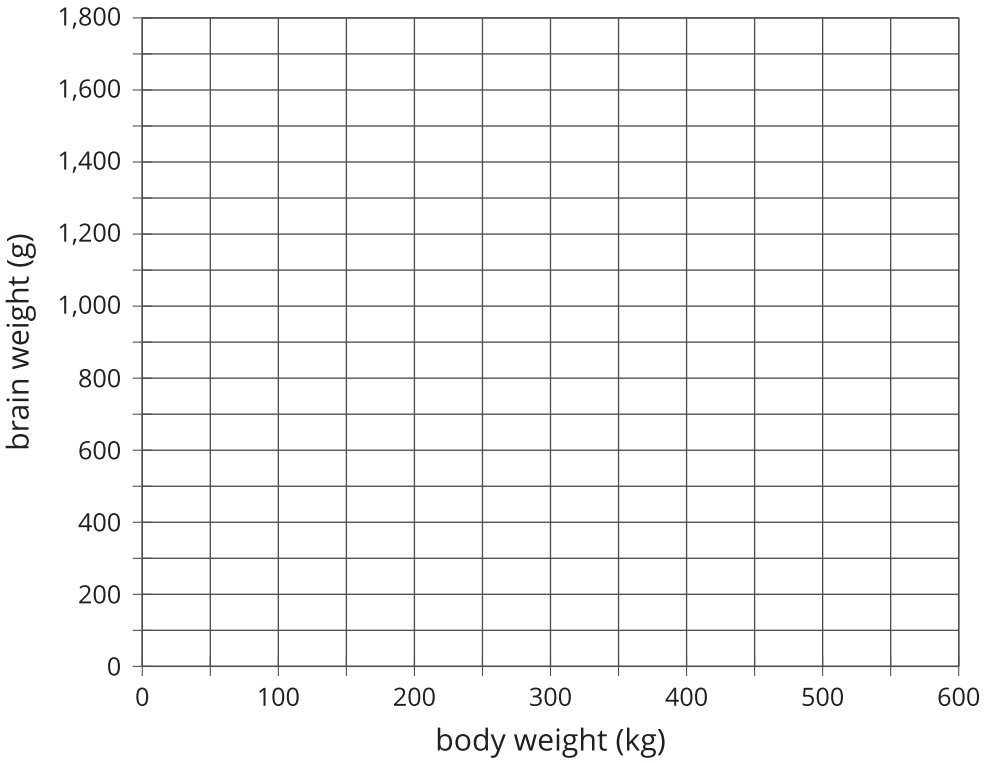
What does the rate of change of the function tell you about the association between stride length and speed?

8.2 Animal Brains

Is there an association between the weight of an animal's body and the weight of the animal's brain?

Use the data in the table to make a scatter plot. Are there any outliers?

animal	body weight (kg)	brain weight (g)
cow	465	423
grey wolf	36	120
goat	28	115
donkey	187	419
horse	521	655
potar monkey	10	115
cat	3	26
giraffe	529	680
gorilla	207	406
human	62	1,320
rhesus monkey	7	179
kangaroo	35	56
sheep	56	175
jaguar	100	157
chimpanzee	52	440
pig	192	180



1. After removing the outliers, does there appear to be an association between body weight and brain weight? Describe the association in a sentence.

2. Using a piece of pasta and a straightedge, fit a line to your scatter plot, and estimate its slope. What does this slope mean in the context of brain and body weight?

3. Does the fitted line help you identify more outliers?

Are you ready for more?

Use one of the suggestions or find another set of data that interests you to look for associations between the variables.

- Number of wins vs. number of points per game for your favorite sports team in different seasons
- Amount of money made vs. critic rating for your favorite movies
- Price of a ticket vs. stadium capacity for popular bands on tour

After you have collected the data,

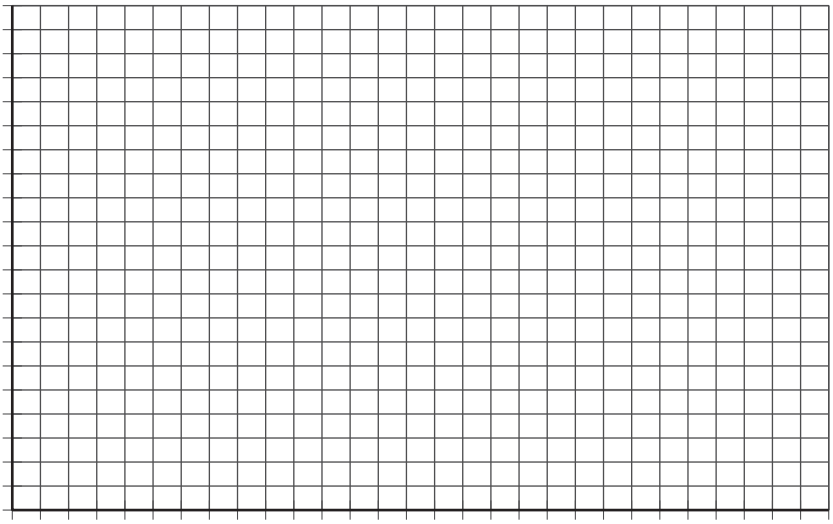
1. Create a scatter plot for the data.
2. Are any of the points very far away from the rest of the data?
3. Would a linear model fit the data in your scatter plot? If so, draw it. If not, explain why a line would be a bad fit.
4. Is there an association between the 2 variables? Explain your reasoning.

8.3 Average Page Weight

Earlier, your class gathered data on the number of pages and weight of books.

1. Sometimes the average weight per page of a book is about 1 ounce per 50 pages. Is this true for any of the books you measured?

2. Make a scatter plot for the number of pages and weight data, and describe any association.



3. Is the line $y = \frac{1}{50}x$ a good fit for the data? If so, explain why. If not, find the equation of a line that fits the data better.

Lesson 8 Summary

People often collect data in two variables to investigate possible associations between two numerical variables and use the connections that they find to predict more values of the variables.

Data analysis usually follows these steps:

1. Collect data
2. Organize and represent the data, then look for an association
3. Identify any outliers and try to explain why these data points are exceptions to the trend that describes the association
4. Find a function that fits the data well

Although computational systems can help with data analysis by graphing the data, finding a function that might fit the data, and using that function to make predictions, it is important to understand the process and think about what is happening. A computational system may find a function that does not make sense or use a line when the situation suggests that a different model would be more appropriate.