Suppose a new person came into class with a navel measuring exactly one meter above the ground. How tall do you think that person would be?

Suppose a really tall person came in, someone two and a half meters tall, how tall is that? How far above the floor would that person's navel be? Is it reasonable to make this prediction even though we have no data in this area?

These questions are central to learning to use scatter plots in particular and real-life data in general. They don't have a single answer but rather a range of possibilities. The second question also asks students to *extrapolate*—to predict beyond the bounds of the original data.

Recognizing Scatter Plots with Perfect Correlation

In order for students to recognize scatter plots of data that have a strong correlation, they will need to produce some scatter plots of this kind for themselves.

Here are two suggestions you can use with your class. These scatter plots ought to form straight lines, since once you know a value for one of the variables, the second can be determined by a mathematical formula. These sets of variables have *perfect correlation.* Variation in the first example will be due to student errors in computation and can be corrected. The "noise" from the measurements will account for small deviations in the second example.

■ YOUR AGE IN MONTHS VS. NUMBER OF MONTHS UNTIL YOU ARE SIXTEEN

You might make a sign-in for this information on chart paper or the chalk board. This scatter plot ought to come out to be a perfectly straight line since the two numbers for each student must sum to 16 X 12 = 192. Don't tell them this, however. Most eighth graders think the two numbers are completely independent from each other. It will take some discussion before they realize that, once you know a value for one of these variables, the other is determined. That is, one *depends* on the other.

From previous work, you might expect to say one *causes* the other. However, scientists and statisticians tend to say one variable *depends* on the other when there is a precise mathematical relationship between the two. They save the term *cause* for less exact situations.

Students may find errors to correct on the scatter plot during or after the discussion.

■ CIRCLES: DIAMETER VS. CIRCUMFERENCE

Give each group of four students a large piece of paper about a meter square. Have them draw a large circle using a waste basket or other large circular object that takes up most of the paper. On the same sheet of paper have them draw three more circles using different-sized smaller

objects as patterns. Give out measuring tapes or string and rulers and have students find the circumference and diameter for each circle.

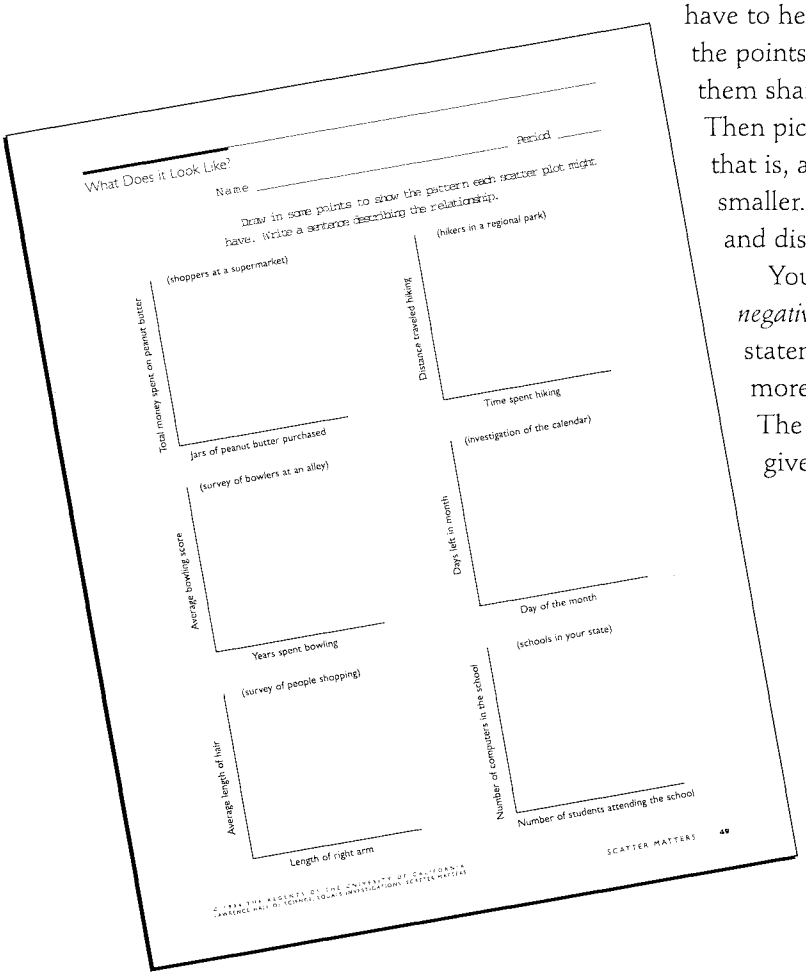
Set up a scatter plot of diameter vs. circumference on the overhead. Call for data on a circle from each group and plot it. Have each student copy and complete the scatter plot using the rest of her group's data and write a comment on what the scatter plot shows. These plots ought to be close to a straight line. Deviation will be caused by variation in measurement.

■ WHAT DOES IT LOOK LIKE?

This activity is the flip side of the prediction questions. There, we looked at the points, inferred a relationship, and predicted values. Here, we look at a relationship and infer the points.

Pick one example from *What Does It Look Like?* that you think would show a *positive correlation*, and ask students to speculate what the scatter plot might look like. Ask them to sketch it. You may have to help them get the idea that they are making up the points, just sketching in the general idea. Have them share their ideas and drawings with the class. Then pick one that might show a *negative correlation,* that is, as one variable gets larger the other gets smaller. Have the class compare the two examples and discuss what they mean.

You won't expect the students to use terms like *negative correlation* but rather to be able to make statements like, "you can see on the graph that the more pollution there is, the fewer fish there are." The sheet with the six blank scatter plots can be given for homework.


What Does It Look Like?

Name _____ Period _____

Draw in some points to show the pattern each scatter plot might have. Write a sentence describing the relationship.

(shoppers at a supermarket)
Total money spent on peanut butter
Jars of peanut butter purchased

(hikers in a regional park)
Distance traveled hiking
Time spent hiking

(survey of bowlers at an alley)
Average bowling score
Years spent bowling

(investigation of the calendar)
Days left in month
Day of the month

(survey of people shopping)
Average length of hair
Length of right arm

(schools in your state)
Number of computers in the school
Number of students attending the school

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