Objective

Create and use a scatter plot to make a conjecture.

Common Core State Standards

- **8.SP.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

- **8.SP.2** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

Statistics and Probability

Make a Conjecture Using a Scatter Plot

Students apply the skills of organizing and representing data to examine relationships between characteristics in a population. Scatter plots are used to test for trends in data—that is, to test for correlations between characteristics. The lesson prepares students to explore other relationships in or between populations.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *Will Keenan's data be appropriate for all students in the class?* Have students explain their answers.

- **Ask:** *Why might more than one point have the same x-coordinate? The same y-coordinate?*

- Discuss the positive trend shown by the scatter plot. **Ask:** *How would a scatter plot show a negative trend? How would it show no trend?*

Solve It

Reread the problem with students. Have them discuss the trend in the data. Ask students to make a conjecture about how quiz score depends on hours of study. Stress, however, that a trend does not prove a cause-and-effect relationship.

More Ideas

For other ways to teach about scatter plots—

- Extend this problem by having students create tables of values from their lines of best fit. Have them use their tables to predict scores based on number of hours of study.

- Encourage students to use real data, such as baseball or basketball statistics from their local newspaper, to create a scatter plot. Have students plot the data on a pegboard. Then have them transfer each scatter plot to graph paper and draw a line of best fit.

Formative Assessment

Have students try the following problem.

Which scatter plot shows a negative trend?

A.   B.   C.   D.
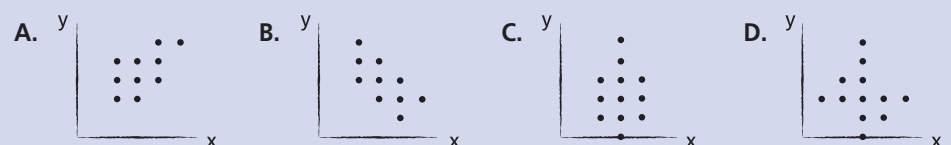
Try It!   20 minutes | Pairs

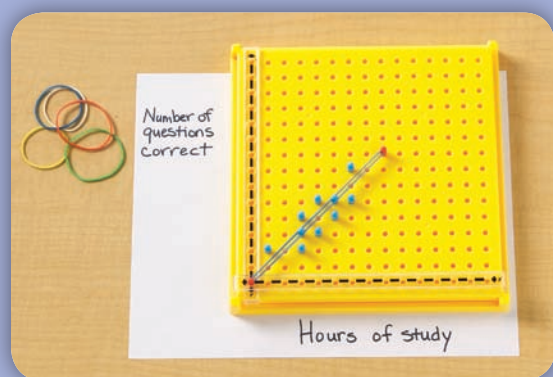Here is a problem about making and using a scatter plot.

Keenan wants to see if there is a relationship between the number of hours a classmate studies and the number of questions he or she gets correct on a quiz. He takes a sample of ten classmates and makes the table shown below. Does there appear to be a relationship between the number of hours of study and the number of questions answered correctly?

Hours of Study	3	6	1	4	3	3	5	4	5	6
Number of Questions Correct	4	7	2	5	3	2	5	3	4	5

Introduce the problem. Then have students do the activity to solve the problem. Distribute the materials.

Materials
- XY Coordinate Pegboard (1 per pair)
- paper (1 sheet per pair)
- pencils (1 per pair)

1. Ask students to set up their pegboards for Quadrant I graphing and have them plot the data from the table. **Say:** *Let the x-axis represent the hours of study and let the y-axis represent the number of questions correct.*

2. Introduce the term *scatter plot*. **Say:** *A scatter plot is a plot of data points. If the data points rise from left to right, then they show a positive trend. If the data points fall from left to right, then they show a negative trend. If the data points neither rise nor fall, then they show no trend.* **Ask:** *Do you see a trend? What kind? What conjecture would you make from the data?* Elicit that the data show a positive trend between the number of hours of study and the number of questions answered correctly.

3. Discuss how to form the line of best fit through the data. Tell students that they should make a straight line, using a rubber band, such that there are about the same number of data points above the line as there are below it, and such that the points above the line are the same average distance from the line as the points below. **Ask:** *Which coordinates does your line pass through?*

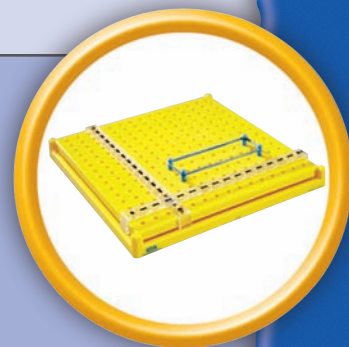### ⚠ Look Out!

Some students might connect the points to make a line graph. Increase the data size, if necessary, to demonstrate that it is not meaningful to connect all the points. Point out that the line of best fit only helps to show the trend in the data—nothing more.
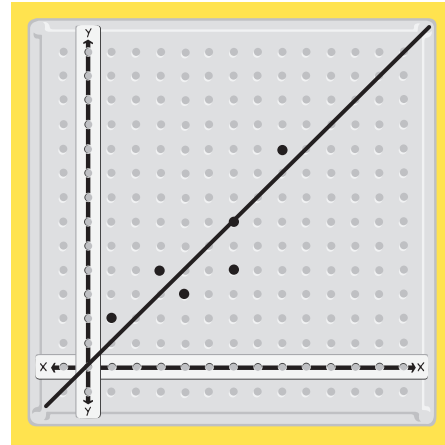
Answer Key

Use an XY Coordinate Pegboard to plot the points and create a scatter plot. Find the line of best fit on your pegboard. Sketch the line of best fit.
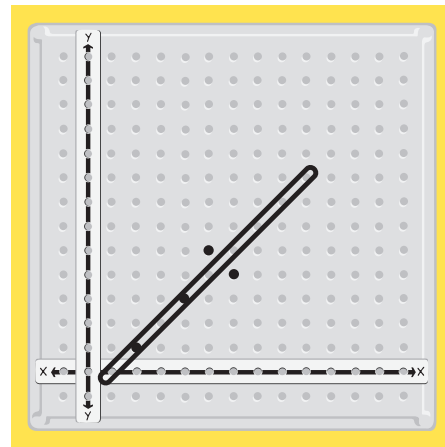
(Check students' work.)

1.

x	y
1	2
3	4
4	3
6	4
6	6
8	9

Using an XY Coordinate Pegboard, plot the data in the table. Find the line of best fit. Make predictions to complete the table.
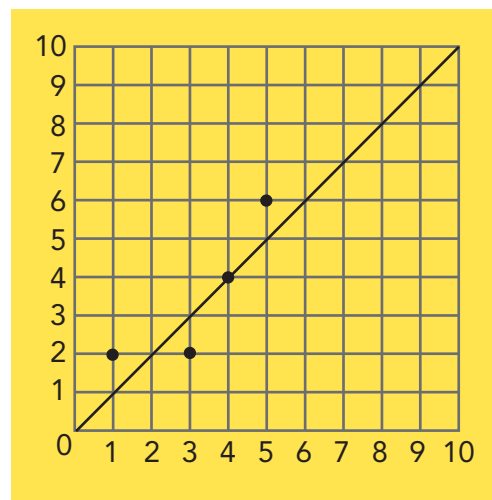
2.

x	y
2	1
4	3
5	5
6	4
7	6
8	7

Make a scatter plot of the data. Find the line of best fit. Make predictions to complete the table.

3.

x	y
1	2
3	2
4	4
5	6
8	8
10	10

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Answer Key

Challenge!   How do you decide where to place the line of best fit?
Can there be more than one line of best fit? Explain.

Challenge: (Sample) The line is placed so as many data points as possible are
as close to it as possible. While there may be several lines that are good fits,
there is only one line of best fit.

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Name _____

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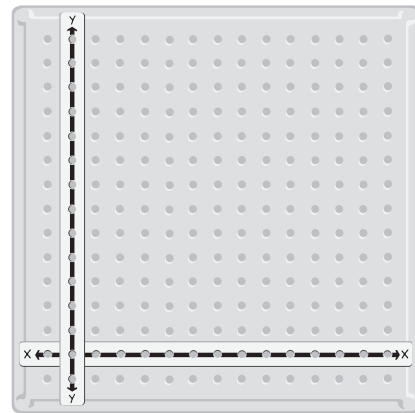
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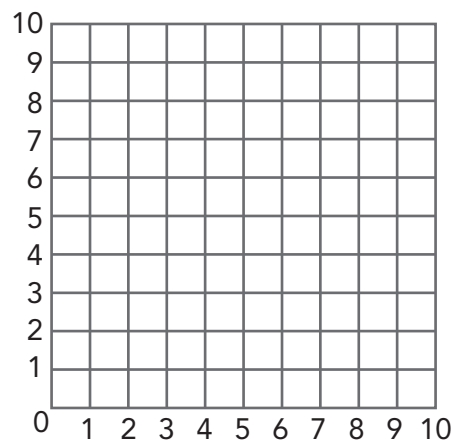
2.

x	y
2	1
4	3
5	5
6	4
7	6
8	7

Make a scatter plot of the data. Find the line of best fit. Make predictions to complete the table.

3.

x	y
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Name _____

Challenge!   How do you decide where to place the line of best fit?
Can there be more than one line of best fit? Explain.

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