LESSON 1

Statistics and Probability

Scatter Plot Diagrams

In previous activities, students have learned a great deal about linear relationships and some basic nonlinear relationships. In this activity, students will use their knowledge of graphs to determine whether a given scatter plot diagram shows a correlation between two sets of data.

Objective

Graph a set of data and understand the basics of scatter plots.

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.

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

Talk About It

Discuss the Try It! activity.

- **Say:** *If one variable gets larger as the other variable gets larger, the two variables have a positive correlation. The graph will appear to go "uphill" from the y-axis. If one variable gets smaller as the other gets larger, the two variables have a negative correlation. The graph will appear to go "downhill" from the y-axis. If you can't determine which way the data point, or even that there is any trend, the graph shows no correlation.*
- **Ask:** *What does the first scatter plot show?* Elicit that it shows a positive correlation between the number of hours the team has practiced and the number of hits they get. **Ask:** *What does the second scatter plot show?*

Solve It

Reread the problem with students. After students determine that there is a correlation between the scattered coordinate pairs, have them estimate values greater than $x = 14$ that could reasonably appear on each graph.

More Ideas

For another way to teach about scatter plots—

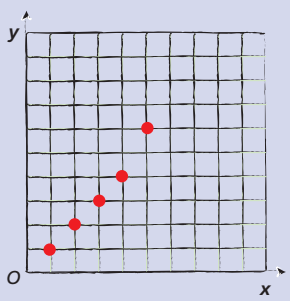
- Have students repeat the exercise using the XY Coordinate Pegboard and statistics from their favorite sports team.

Formative Assessment

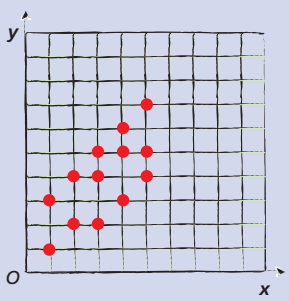
Have students try the following problem.

Which graph shows no correlation?

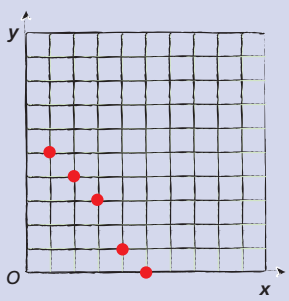
A.



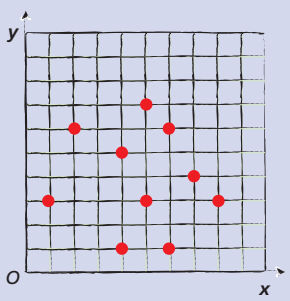
B.

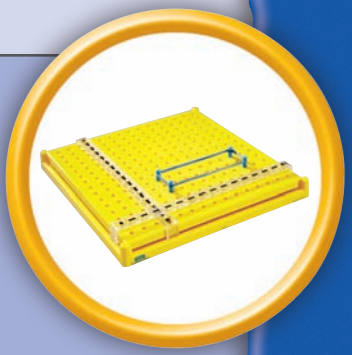


C.



D.





Try It! 20 minutes | Pairs

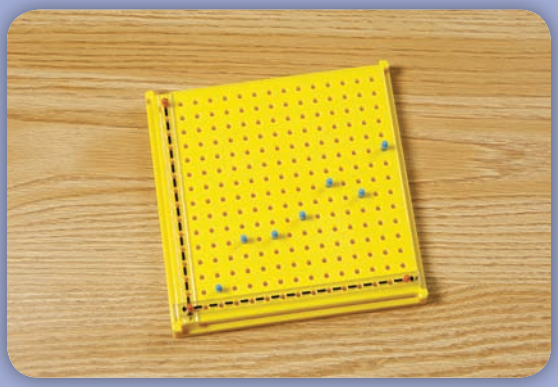
Here is a problem about scatter plots and correlations.

The coach of the softball team is reviewing some statistics for the first seven games. Is there a positive correlation, a negative correlation, or no correlation between hours of practice and the number of hits the team got, or between hours of practice and the number of errors the players made?

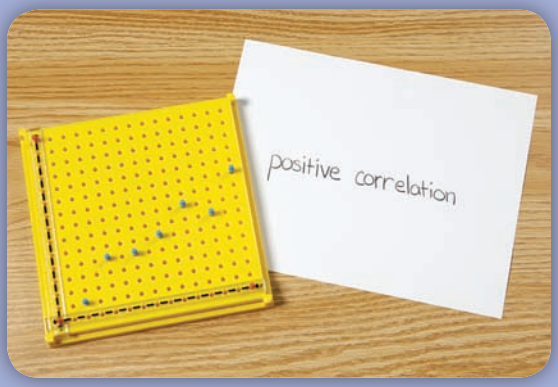
Hours of Practice	2	4	6	8	10	12	14
Number of Hits	1	4	4	5	7	6	9
Number of Errors	8	6	5	5	3	2	2

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

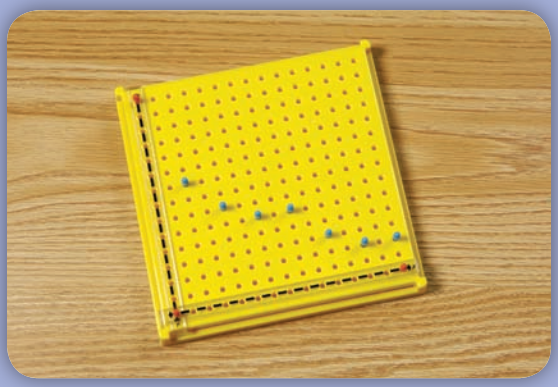
Materials
- XY Coordinate Pegboard



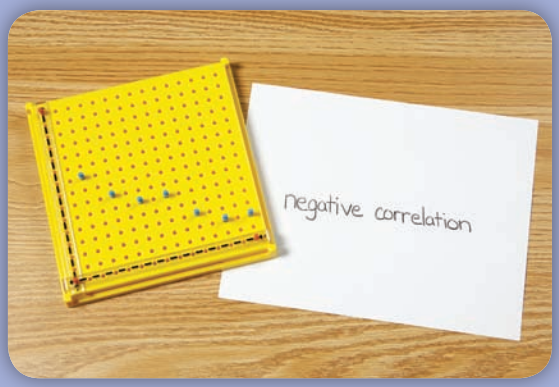
1. Have students plot the coordinate pairs for Hours of Practice (*x*) and Number of Hits (*y*) onto the pegboard.



2. Have students examine the graph.
Ask: *Which way do the data points go? Do the data show a positive correlation, a negative correlation, or no correlation?*



3. Have students plot the coordinate pairs for Hours of Practice (*x*) and Number of Errors (*y*).



4. Have students examine the graph.
Ask: *Do the data show a positive correlation, a negative correlation, or no correlation?*

⚠ Look Out!

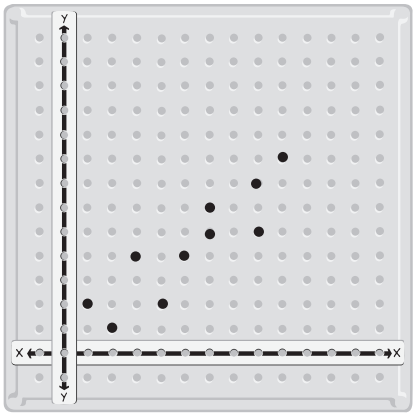
Some students may think that the coordinate pairs should form a perfect line. Reassure them that the points do not need to do this in order to show a correlation.

Answer Key

Use an XY Coordinate Pegboard to model the scatter plot shown. Write the ordered pairs that are graphed. Identify a correlation as positive or negative. Explain your answer.

(Check students' work.)

1.



x	1	2	3	4	5	6	6	8	8	9
y	2	1	4	2	4	5	6	5	7	8

This scatter plot shows a positive correlation.

As the *x*-values increase, the *y*-values increase.

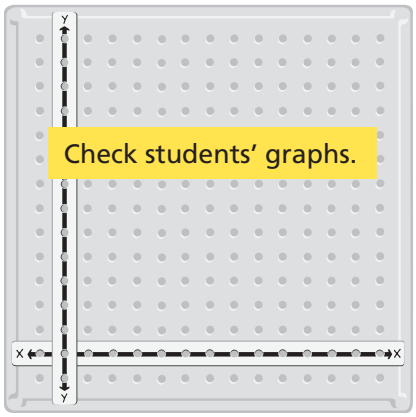
Using an XY Coordinate Pegboard, model the data given in the table. Does the scatter plot show a positive or negative correlation? Explain.

2.

x	1	2	3	4	5	7	9
y	8	5	5	6	3	2	1

This scatter plot shows a negative correlation.

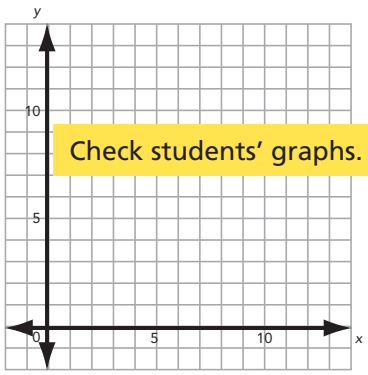
As the *x*-values increase, the *y*-values decrease.



Graph each set of ordered pairs. What type of correlation is shown?

3.

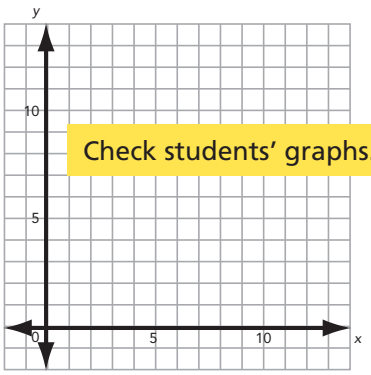
x	1	3	5	6	10	12
y	13	11	6	4	3	1



negative

4.

x	4	5	8	9	11	12
y	3	3	8	9	10	14



positive

Answer Key

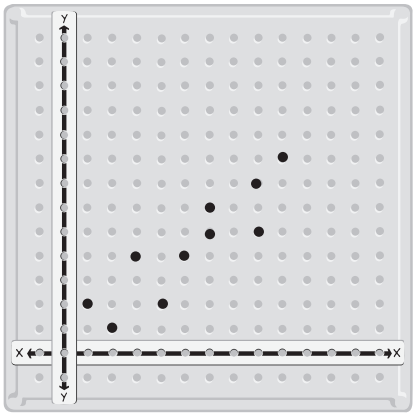
Challenge! Describe the appearance of a scatter plot that shows a negative correlation. What does a negative correlation mean in terms of the *x*- and *y*-values? Describe the appearance of a scatter plot that shows a positive correlation. What does a positive correlation mean in terms of the *x*- and *y*-values?

Challenge: (Sample) A scatter plot that shows a negative correlation will have points that generally begin on the left of the graph and get closer to the *x*-axis as the *x*-values increase. The meaning of a negative correlation is that as the *x*-values increase, the *y*-values decrease. A scatter plot that shows a positive correlation will have points that generally begin on the left of the graph and get farther from the *x*-axis as the *x*-values increase. The meaning of a positive correlation is that as the *x*-values increase, the *y*-values increase.

Name _____

Use an XY Coordinate Pegboard to model the scatter plot shown. Write the ordered pairs that are graphed. Identify a correlation as positive or negative. Explain your answer.

1.



x	1	2	3	4	5	6	6	8	8	9
y										

This scatter plot shows a _____ correlation.

_____

_____

Using an XY Coordinate Pegboard, model the data given in the table. Does the scatter plot show a positive or negative correlation? Explain.

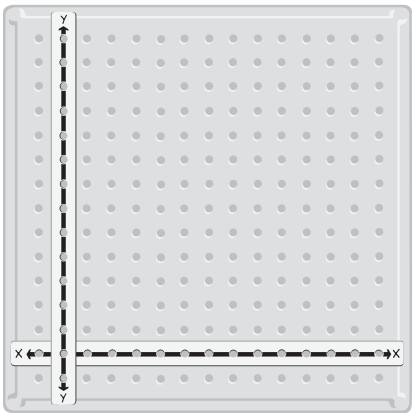
2.

x	1	2	3	4	5	7	9
y	8	5	5	6	3	2	1

This scatter plot shows a _____ correlation.

_____

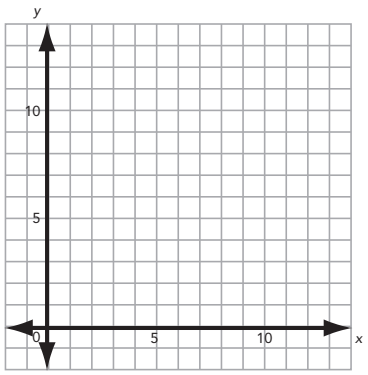
_____



Graph each set of ordered pairs. What type of correlation is shown?

3.

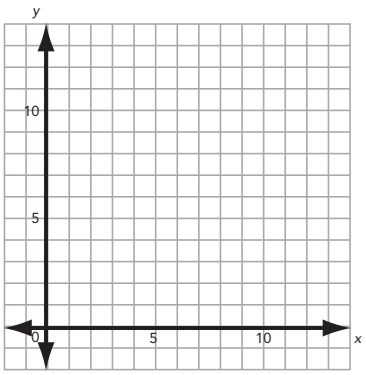
x	1	3	5	6	10	12
y	13	11	6	4	3	1



_____

4.

x	4	5	8	9	11	12
y	3	3	8	9	10	14



_____

Name _____

Challenge! Describe the appearance of a scatter plot that shows a negative correlation. What does a negative correlation mean in terms of the *x*- and *y*-values? Describe the appearance of a scatter plot that shows a positive correlation. What does a positive correlation mean in terms of the *x*- and *y*-values?