

Objective

Describe a distribution of data values.

Common Core State Standards

- **6.SP.2** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
- **6.SP.4** Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- **6.SP.5a** Summarize numerical data sets in relation to their context, such as by reporting the number of observations.

Statistics and Probability

Distributions

Students learn early that data, such as that collected from a survey, can be displayed and analyzed in a table, chart, or graph. In this lesson, students explore how to analyze data to answer questions about how the data are distributed. A distribution can be described by its center (mean, median, and mode), spread (range), and overall shape (skewed or symmetric).

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

Talk About It

Discuss the Try It! activity.

- Elicit that the data are concentrated in the middle and “tail off” to both sides. **Say:** *Some distributions are concentrated to one side and tail off to the other side. These are called skewed distributions.* Explain that being skewed left means being concentrated to the left and tailing off to the right. Being skewed right means the opposite. Point out that data plots can have other shapes, too.
- Have the class think of examples of data that might be distributed in different ways. For example, a survey on the number of siblings students have might produce data that’s skewed left because the majority of students might have 0, 1, or 2 siblings. The number of siblings will tail off to the right.

Solve It

Reread the problem with students. Have students write a description of the shape of the data. Have them determine the number of games (observations) that are represented and identify the median and the range. Have students write an explanation for why the number of shots on goal might be distributed the way it is.

More Ideas

For other ways to teach about describing distributions—

- Have students do the activity by drawing the x-axis on a piece of paper and using Centimeter Cubes to plot the counts.
- Have students create different shapes of distributions using Centimeter Cubes. For each distribution, have students transfer the data to a table. Ask students to explain what the data represent and why the distribution is shaped the way it is.

Formative Assessment

Have students try the following problem.

What shape would the distribution of scores on an easy test probably have?

- A. symmetric B. skewed right C. skewed left D. uniform

Try It! 30 minutes | Groups of 4

Here is a problem about describing distributions.

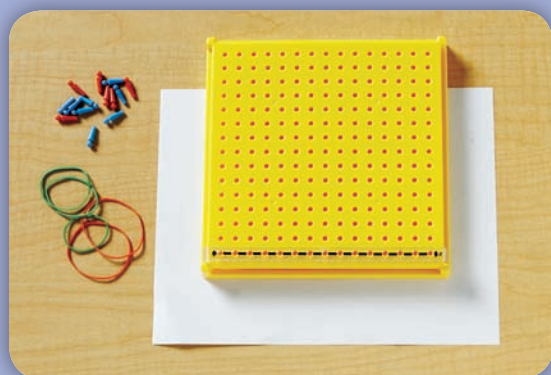
Coach Blackwell collected data on his soccer team for three seasons. The table shows his data for shots on goal. Make a display of the data. Describe the distribution of values. Is the distribution symmetric? Explain.

Shots on Goal	2	3	4	5	6	7	8	9	10	11	12
Number of Games	1	1	2	4	4	5	4	4	2	1	1

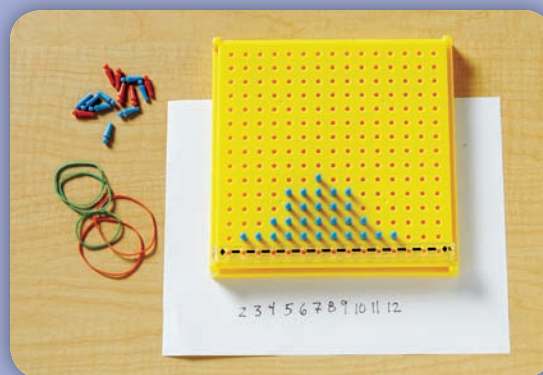
Introduce the problem. Then have students do the activity to solve the problem. Distribute pegboards to students.

Materials

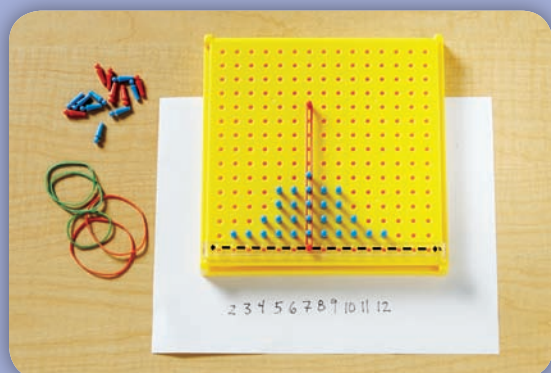
- XY Coordinate Pegboards



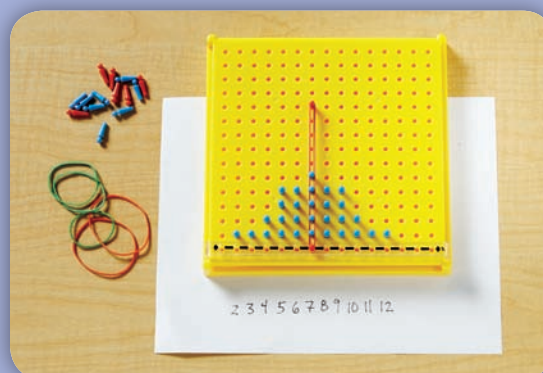
1. Say: Let's use the pegboard to display the data given in the problem. Remove the y-axis from the pegboard. Position the x-axis near the bottom. Help students remove the y-axis if necessary.



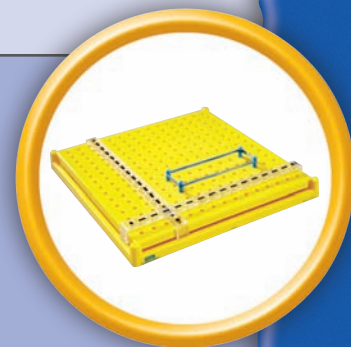
2. Say: Use the x-axis for the number of shots on goal. Plot the number of games for each value of shots on goal. Help students create a line plot using pegs for the counts. For example, have students insert 1 peg above $x = 2$ (to represent 1 game having 2 shots on goal), 1 peg above $x = 3$, 2 pegs above $x = 4$, and so forth, until every game has been accounted for.



3. Say: Let's talk about the shape of the data plot. **Ask:** Does it have symmetry? Elicit that it does have symmetry. Have students show the line of symmetry using a rubber band. Explain that when data are distributed equally about a center value (or nearly so), the distribution is said to be *symmetric*.



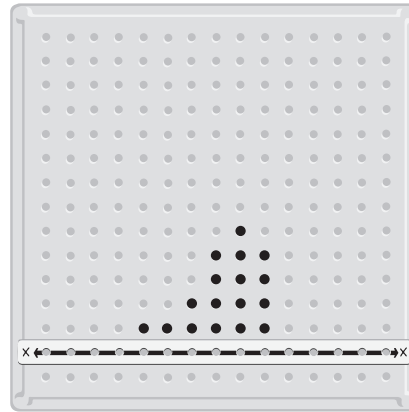
4. Ask: How many games are represented by the data? Elicit that 29 games are represented. **Say:** Find the median number of shots on goal. Find the range. Provide guidance if necessary. The median is 7 and the range is 10.



Use an XY Coordinate Pegboard to plot the data.
Use the plot to answer Questions 1–4.

(Check students' work.)

Score (x)	Number of Students (y)
5	1
6	1
7	2
8	4
9	5
10	4



- How many observations are there?
- What is the median score?
- What is the range of the scores?
- Describe the shape of the distribution.

17

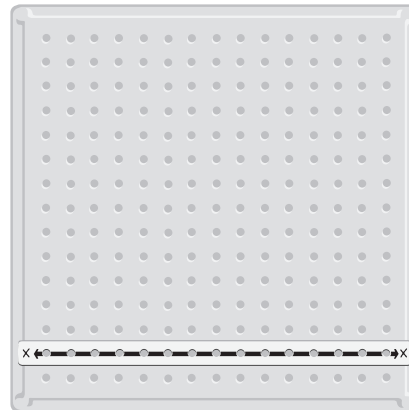
9

5

skewed right

Plot the data on the XY Coordinate Pegboard. Use the plot to answer Questions 5–8.

Score (x)	Number of Students (y)
4	1
5	1
6	2
7	4
8	3
9	1
10	1



- How many observations are there?
- What is the median score?
- What is the range of the scores?
- Describe the shape of the distribution.

13

7

6

symmetric

Answer Key

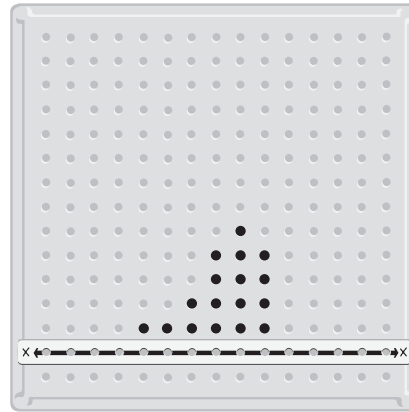
Challenge! Refer to the two distributions you used to answer Questions 1–8. Find the mean score in each case. Round your answers to the nearest hundredth. Show your work. Why is the mean closer to the median in the second distribution?

Challenge: 8.35; 7.08; It is more symmetric.

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Use an XY Coordinate Pegboard to plot the data.
Use the plot to answer Questions 1–4.

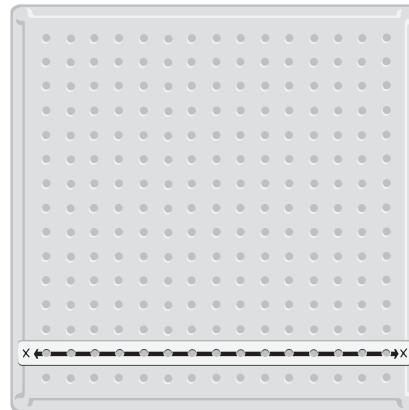
Score (x)	Number of Students (y)
5	1
6	1
7	2
8	4
9	5
10	4



1. How many observations are there? _____
2. What is the median score? _____
3. What is the range of the scores? _____
4. Describe the shape of the distribution. _____

Plot the data on the XY Coordinate Pegboard. Use the plot to answer Questions 5–8.

Score (x)	Number of Students (y)
4	1
5	1
6	2
7	4
8	3
9	1
10	1



5. How many observations are there? _____
6. What is the median score? _____
7. What is the range of the scores? _____
8. Describe the shape of the distribution. _____

Challenge! Refer to the two distributions you used to answer Questions 1–8. Find the mean score in each case. Round your answers to the nearest hundredth. Show your work. Why is the mean closer to the median in the second distribution?

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.