

## Lesson 5-8

### Example 1 Find the Mean, Median, and Mode

**TEST SCORES** The test scores of students on the most recent math test are given below. Find the mean, median, and mode.

79 84 63 95 89 71 90 81 77 54 75

$$\begin{aligned}\text{mean} &= \frac{\text{sum of scores}}{\text{number of students}} \\ &= \frac{79 + 84 + 63 + \dots + 75}{11} \\ &= \frac{858}{11} \text{ or } 78\end{aligned}$$

The mean test score is 78.

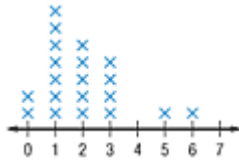
To find the median, order the numbers from least to greatest.

54, 63, 71, 75, 77, 79, 81, 84, 89, 90, 95

The number in the middle location is 79. This is the median.  
There is no mode because each number occurs once in the set.

### Example 2 Use a Line Plot

**FAMILIES** The line plot shows how many siblings students in a fifth grade class have. Find the mean, median, and mode.



$$\text{mean} = \frac{2(0) + 7(1) + 5(2) + 4(3) + 1(5) + 1(6)}{20} = 2 \text{ siblings}$$

There are 20 numbers, so the median is the mean of the two middle numbers, 2 and 2.  
The median is 2.

You can see from the graph that 1 occurs most frequently in the data set. So, 1 is the mode.

**Example 3 Find Extreme Values that Affect the Mean**

**SPEED** The data below shows the speed in miles per hour for cars clocked on a stretch of highway. Identify an extreme value and describe how it affects the mean.

65 72 63 69 74 81 77 66 70 42 68 74 76 71

The data value 42 appears to be an extreme value because it is 21 less than the closest data value, 63. Calculate the mean with and without the outlier to find how it affects the mean.

**mean with extreme value**

$$\frac{\text{sum of values}}{\text{number of values}} = \frac{968}{14} \\ \approx 69.1$$

**mean without extreme value**

$$\frac{\text{sum of values}}{\text{number of values}} = \frac{926}{13} \\ \approx 71.2$$

The extreme value decreases the mean by  $71.2 - 69.1$  or about 2.

**Example 4 Use Mean, Median, and Mode to Analyze Data**

**AGE** Compare and contrast the ages of males and females participating in a college computer course.

**Males:** 21, 35, 19, 23, 20, 52

**Females:** 19, 22, 28, 21, 23

**Males**

$$\text{Mean} = \frac{21 + 35 + 19 + 23 + 20 + 52}{6} \\ \approx 28.3 \text{ years old}$$

19, 20, 21, 23, 35, 52

$$\text{median} = \frac{21 + 23}{2} \text{ or } 22 \text{ years old}$$

no mode

**Females**

$$\text{mean} = \frac{19 + 22 + 28 + 21 + 23}{5} \\ = 22.6 \text{ years old}$$

19, 21, 22, 23, 28

$$\text{median} = 22 \text{ years old}$$

no mode

The age of 52 in the male group is an extreme value that increases the mean age for that group. However, the median age for the two groups is the same.

**Example 5 Work Backward****Grid-In Test Item**

Bob needs an average score of 81 on 6 exams to earn a B. The mean of his first five scores was 82. What is the lowest score that he can receive on the sixth exam to earn a B?

**Read the Test Item** To find the lowest score, write an equation to find the sum of the first five scores. Then write an equation to find the sixth score.

**Solve the Test Item**

**Step 1** Find the sum of the first five scores,  $x$ .

$$82 = \frac{x}{5}$$

$$82(5) = \frac{x}{5}(5) \quad \text{Multiply each side by 5.}$$

$$410 = x \quad \text{Simplify.}$$

**Step 2** Find the sixth score,  $y$ .

$$\text{Mean} = \frac{\text{sum of the first five scores} + \text{sixth score}}{6} \quad \text{Write an equation.}$$

$$81 = \frac{410 + y}{6} \quad \text{Substitution}$$

$$486 = 410 + y \quad \text{Multiply each side by 6 and simplify.}$$

$$76 = y \quad \text{Subtract 410 from each side and simplify.}$$

The lowest score Bob can receive to earn a B is 76.