

**What You'll Learn**

To find and analyze the median and mode of a data set

**New Vocabulary** median, mode

**Why Learn This?**

Scientists use the mean, median, and mode to describe sets of data, including fish populations.



The **median** is the middle number in a set of ordered data. The median gives a good description of numerical data with outliers.

4 7 9 13 25



median

For an even number of data items, you can find the median by adding the two middle numbers and dividing by 2.

**EXAMPLE****Finding the Median**

- 1 **Gridded Response** A biologist studying the ecology of a river makes a weekly fish count. The results are 19, 18, 22, 23, 20, 24, 23, 20, 34, and 19. Find the median number of fish.

18, 19, 19, 20, 20, 22, 23, 23, 24, 34 ← Order the data. Since there are 10 items, use the two middle values.

$$\frac{20 + 22}{2} = \frac{42}{2}, \text{ or } 21 \quad \leftarrow \text{Find the mean of 20 and 22.}$$

The median number of fish is 21.

**Example**

- 1 **Finding the Median** A bird-watcher keeps a count of the number of birds she sees each week. The results are 23, 35, 27, 55, 41, 23, 45, and 69. Find the median number of birds.

23, 23, 27, 35, 41, 45, 55, 69 ← Order the data.

23, 23, 27, 35, 41, 45, 55, 69 ← Since there are 8 items (an even number), use the two middle values.

$$\frac{35 + \boxed{\phantom{000}}}{2} = \frac{\boxed{\phantom{000}}}{2} = \boxed{\phantom{000}} \quad \leftarrow \text{Find the mean of 35 and } \boxed{\phantom{000}}.$$

The median number of birds is  $\boxed{\phantom{000}}$ .

**Quick Check***table talk about this problem*

1. Weekly sales of comics at a store are 39, 19, 28, 9, 32, 35, and 17 comics. What is the median number of comics sold?



The **mode** is the data item(s) that appears most often. A data set may have more than one mode. If all data items occur the same number of times, there is no mode. The mode is useful when the data items are repeated or not numerical.

## EXAMPLE

### Finding the Mode

- 2 The list shows the favorite lunches of 15 students. Find the mode.

Group the data.

pizza, pizza, pizza, pizza, pizza  
hamburger, hamburger, hamburger  
taco, taco, taco, taco  
spaghetti, spaghetti, spaghetti

Pizza occurs the most. It is the mode.

Hamburger, pizza, taco, pizza, spaghetti,  
taco, spaghetti, hamburger, hamburger,  
pizza, taco, pizza, pizza, spaghetti, taco

## Examples

- 2 **Finding the Mode** The list shows the favorite colors of 12 children. Find the mode.

blue, red, blue, yellow, yellow, blue, red, blue, yellow, blue, red, yellow

Group the data.

blue, blue, blue, blue, blue  
red, red, red  
yellow, yellow, yellow, yellow

occurs the most. It is the .

### EXAMPLE Analyzing Data

#### Amount of Time Spent on Internet (minutes)

50	276	57	50
62	53	72	71
63	60	22	

- 3 Find the mean, median, and mode for the number of minutes spent on the Internet. Does the mean, median, or mode best describe the typical amount of time spent on the Internet?

**mean**  $\frac{50 + 276 + 57 + 50 + 62 + 53 + 72 + 71 + 63 + 60 + 22}{11} = \frac{836}{11}$   
 $= 76$

**median** 22 50 50 53 57 60 62 63 71 72 276: 60

**mode** 50

The mode and mean are close to only a few data points. The median is close to most of the data items. So the median best describes the typical amount of time spent on the Internet.

- 3 Analyzing Data The ages of everyone at a family reunion are listed. Find the mean, median, and mode. Which one best describes the typical age of the family members at the reunion?

22, 100, 26, 4, 30, 33, 21, 44, 47, 83, 47

**mean**  $\frac{22 + 100 + 26 + 4 + 30 + 33 + 21 + 44 + 47 + 83 + 47}{11} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} \approx \boxed{\phantom{000}}$

**median** 4, 21, 22, 26, 30, 33, 44, 47, 47, 83, 100:  $\boxed{\phantom{000}}$

**mode**  $\boxed{\phantom{000}}$

The  $\boxed{\phantom{000}}$  and the  $\boxed{\phantom{000}}$  are only close to some of the data points.

The mean best describes the typical age of the family members at the reunion.

## Quick Check

2. The list shows the favorite lunches of 15 students. How many students would have to switch from hamburger to taco as their favorite lunch for taco to be the only mode?

hamburger, pizza, taco, pizza, spaghetti, taco, spaghetti, hamburger,  
hamburger, pizza, taco, pizza, pizza, spaghetti, taco

3. The top five women's 1-meter diving scores are 288.75, 261.83, 254.85, 254.1, and 246.8. Does the mean, median, or mode best describe these data? Explain.

## Check Your Understanding

1. **Vocabulary** The (mean, median, mode) of the following data is 4: 1, 2, 2, 4, 7, 9, 20.

### Vocabulary Tip

The word *median* means "middle."

**Find the median and mode(s) of each data set.**

3. 5, 7, 8, 8, 8, 10, 12

4. 1, 1, 1, 2, 3, 4, 5, 5, 5

**Practice 9-2** Median and Mode

Find the median and the mode of each data set.

- |  |  |
|--|--|
| <p>1. 6, 10, 12, 5, 7, 12, 9<br/>_____</p> <p>3. 2, 4, 5, 4, 3, 4, 2, 3, 3<br/>_____</p> | <p>2. 24, 24, 28, 32, 40, 42<br/>_____</p> <p>4. 12.2, 12.8, 12.1, 12.2, 12.3<br/>12.5, 12.4<br/>_____</p> |
|--|--|

Use the table for Exercises 5–8.

Last Year's Monthly Rainfall	
Month	Rainfall (inches)
January	5
February	4.5
March	6
April	15
May	5
June	3
July	2
August	2
September	1
October	2
November	3
December	4.5

5. What was the mean monthly rainfall last year? \_\_\_\_\_
6. What is the median rainfall of all the months listed? \_\_\_\_\_
7. What is the mode of all the months listed? \_\_\_\_\_
8. Does the mean, median, or mode best describe last year's rainfall? \_\_\_\_\_

Each student in a class has taken five tests. The teacher allows the students to pick the mean, median, or mode of each set of scores to be their final score. Which measure should each of these students pick in order to have the highest final score?

- |   |   |
|---|---|
| <p>9. 100, 87, 81, 23, 19<br/>_____</p> | <p>10. 79, 78, 77, 76, 85<br/>_____</p> |
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