

# Make Predictions Using Data



## Getting the Idea

You can use the data from a sample to make predictions about the population. It is important that the sample be representative of the population for the predictions to be reasonable.

### Example 1

There are 60 students who take band classes at Mr. Tempo's school. Mr. Tempo surveyed 10 of those students to find out how long they practice their instruments each day. The survey was randomly distributed and anonymous. The results of the survey are shown below. The times are in minutes.

40, 25, 30, 40, 20, 15, 25, 30, 20, 25

Find the mean practice time for the sample. Predict the mean practice time of all the students who take band classes. Is the prediction reasonable?

**Strategy** Use the mean from the sample data to predict the mean for the population.

#### Step 1

Identify the sample and the population.

The students surveyed are the sample.

The population is all the students who take band classes.

#### Step 2

Find the mean for the sample data.

$$40 + 25 + 30 + 40 + 20 + 15 + 25 + 30 + 20 + 25 = 270$$

$$270 \div 10 = 27$$

The mean practice time is 27 minutes.

#### Step 3

Predict the mean for the population.

The mean practice time for the sample is 27 minutes.

The mean for the population should be about 27 minutes.

#### Step 4

Decide if the prediction is reasonable.

The sample was a random sample.

The size of the sample (10) is fairly large compared to the population (60).

The prediction is reasonable.

**Solution** The mean practice time for the sample is 27 minutes. The sample mean provides a reasonable prediction of the population's mean practice time.

## Example 2

Mindy is the captain of the dance team at her school. She is running in a class election for class president. April surveyed the students on the dance team to see whom they planned to vote for in the election. The results of her survey are shown below.

Student	Number of votes
Mindy	18
Tobey	6
Roland	7

Based on the survey, predict who will win the class election. Is the prediction reasonable?

**Strategy** Use the data to make a prediction. Evaluate the data to decide if the prediction is reasonable.

### Step 1

Use the data to make a prediction.

From the data in the table, the student with the greatest number of votes is Mindy.

Based on the data, Mindy should win the election.

### Step 2

Evaluate the data to decide if the prediction is reasonable.

Mindy has quite a few more votes than either of the other students in the table.

However, Mindy is the captain of the dance team. All of the students who were surveyed are on the dance team. This suggests that they might be biased toward Mindy.

The prediction that Mindy will win does not seem reasonable.

**Solution** Although the results of the survey suggest that Mindy will win, the survey is biased. The prediction that Mindy will win is not reasonable.



## Coached Example

There are 70 students taking a biology class. Eight of the students took a test one day early because they had to go to a track meet on the day of the test. Their test scores are shown below.

87, 84, 89, 91, 95, 73, 90, 87

The students are a representative sample of all the students taking biology. Predict the mean test score for all the students taking biology. Is the prediction reasonable?

What is the sample? \_\_\_\_\_

What is the population? \_\_\_\_\_

Find the mean of the sample to predict the mean of the \_\_\_\_\_.

Find the sum of the test scores. \_\_\_\_\_

Divide the sum by the number of scores in the sample. \_\_\_\_\_

The mean of the sample test scores is \_\_\_\_\_.

Based on the mean test score from the sample, the mean test score for the population should be about \_\_\_\_\_.

Is the prediction reasonable? \_\_\_\_\_

Explain. \_\_\_\_\_

\_\_\_\_\_

**The mean test score for all students taking biology should be about \_\_\_\_\_.**

**The sample mean provides a \_\_\_\_\_ prediction of the population test scores.**



## Lesson Practice

Choose the correct answer.

1. The heights of five pepper plants, in centimeters, selected at random from a greenhouse with 50 pepper plants are shown below.

20, 24, 18, 23, 26

Which is a reasonable prediction of the mean height of all the pepper plants in the nursery?

- A. 19 cm                      C. 25 cm  
B. 22 cm                      D. 26 cm
2. A city is having a clean-up day for the 25 parks in the city. The list below shows the ages of volunteers participating in the clean-up project at one of the parks.
- 17, 18, 15, 16, 24, 20, 16
- Which is a reasonable prediction of the mean age of all the participants in the clean-up project?
- A. 16 years old  
B. 17 years old  
C. 18 years old  
D. 19 years old
3. Ines read the following number of pages each day last week: 76, 123, 84, 110, 36, 20, and 90. Which is a reasonable prediction of the mean number of pages she reads each day throughout the year?
- A. 75                              C. 95  
B. 85                              D. 100

4. Vincent stood by the log flume at an amusement park and asked 120 people exiting the ride to name their favorite ride. The table below shows the results of his survey.

**Favorite Ride**

Ride	Number of People
Roller coaster	25
Ferris wheel	22
Log flume	58
Carousel	15

Which of the following is the most reasonable prediction based on the survey?

- A. The results of the survey that show the log flume is the favorite ride are biased results because only log flume riders were surveyed.
- B. The results of the survey that show the log flume is the favorite ride are reasonable results.
- C. The results of the survey that show the log flume is the favorite ride are unreasonable because the number of people surveyed was so small.
- D. The results of the survey that show the roller coaster is the favorite ride are unbiased results.

5. Carla runs for exercise several days each week. The number of miles she ran each week for the last 6 weeks is shown below.

10, 9, 8, 14, 9, 12

Which is a reasonable prediction of the mean number of miles Carla runs each week throughout the year?

- A. 14  
 B. 13  
 C. 12  
 D. 10
6. Middle school students in a school district are collecting books to share with sister schools in Africa. The table shows the number of books that students at Lincoln Middle School collected for five months.

**Books Collected**

Month	Number of Books
August	60
September	50
October	30
November	40
December	70

- A. What is a reasonable prediction of the mean number of books that students at Lincoln Middle School will collect each month throughout the school year? Explain your thinking.

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- B. What is a reasonable prediction of the mean number of books collected each month by the students at each middle school in the school district? Explain your thinking.

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7. Mr. Dorsey teaches 80 math students. He surveyed 15 of those students to find out how many hours they studied over seven days. The survey was randomly distributed and anonymous. The results of the survey are shown below. Is each statement true? Select Yes or No.

9, 12, 16, 18, 10, 12, 11, 13, 8, 18, 14, 14, 15, 16, 17

- A. The sample is representative of the population.  Yes  No
- B. The mean of the sample data is 15.  Yes  No
- C. The predicted mean for the population is about 13.5.  Yes  No
- D. The prediction that the mean of the population is about 13.5 is reasonable.  Yes  No
8. Hamid stood outside Cooper's department store and asked random people as they exited to name their favorite department store. The table below shows the results of the survey. Which is a true statement? Circle all that apply.

**Favorite Department Store**

Store	Cooper's	Santo's	Green's	Wong's
Number of People	28	16	22	14

- A. The number of people surveyed was 75.
- B. Thirty-five percent of the people said Cooper's was their favorite department store.
- C. The results of the survey were biased.
- D. The results of the survey that show Cooper's was the favorite department store are **not** reasonable.

9. Mrs. Sakata teaches math. She surveyed students about their favorite subject. The results are shown in the table. Select True or False for each statement.

**Favorite Subjects**

Subject	English	Math	Science	History	Art
Number of Students	4	12	5	4	5

- A. Twelve percent of the students chose math as their favorite subject.  True  False
- B. The same number of students picked science and art.  True  False
- C. Less than one-half of the students did **not** pick math.  True  False
- D. The prediction that math would be the favorite subject in the school is reasonable.  True  False
10. Mr. Reed is a librarian. He kept track of the number of people who came to the library last week. The results are shown in the table below. Is each statement true? Select Yes or No.

**Library Attendance**

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Number of People	224	210	208	225	215	212

- A. The total number of people who went to the library last week was 1,294.  Yes  No
- B. The mean number of people who go to the library each day is about 250.  Yes  No
- C. A reasonable prediction of the mean number of people who will go to the library each day throughout the year is 216.  Yes  No
- D. Mr. Reed's prediction is biased.  Yes  No