

# Mean

CA Content Standard 6SDAP1.1: Compute the *range*, *mean*, *median*, and *mode* of data sets.



## BEHIND THE SCENES BACKGROUND INFORMATION

### Objective

Students will compute the mean of data sets.

### Vocabulary Terms

**Data:** Information about a situation, group, or event

**Mean:** The average of a set of numbers

### Materials

- student books, pages 79–83



## SETTING THE STAGE OPENING ACTIVITY

*approximately 5–10 minutes*

### Help students make sense of a data set.

- Have students open their books to page 79 (T131).
- Give students a minute to respond to the prompt: “How could you help the students settle their disagreement?”
- Have students share their answers. Students may come up with a variety of strategies. Their strategies should take all of the players’ heights into account.

### Opening Activity Answers

*You can cross out numbers that appear in both columns and then compare the remaining numbers.*



## DRESS REHEARSAL INSTRUCTION & GUIDED PRACTICE

*approximately 15 minutes*

### Have students compare the means of two data sets.

- Have students turn to page 80 (T132) and follow along as you read aloud. Emphasize that the average of a set of numbers is also known as the mean.
- Guide students through the calculation of the mean height of the players on Team 1.
- Introduce the formula for the mean of a set of data. Connect the formula to the steps that were outlined in the previous problem. Explain that students should always check their addition and division when they use the mean formula.

- Guide students through the calculation of the mean height of the players on Team 2.  
*How many players are on Team 2? 10*  
*What is the sum of the heights of the players on Team 2? 670 inches*  
*Use the mean formula to find the mean height of the players on Team 2. 67 inches*  
*Now compare the means. Which team is taller, on average? Team 1*



**If students make calculation errors, suggest organizational strategies such as crossing out numbers to be sure all of the data is included only one time in the sum.**

### Understanding the Mean as a Balance Point

- Guide students through the first question. Discuss whether a mean of 5 implies that each number in the data set is equal to 5. Explain that there are many other combinations of six numbers that also have a mean of 5.  
*Does this mean that all six students have 5 pets each? Explain. Not necessarily. There are many other combinations that also have a mean of 5.*
- Direct students' attention to the first line plot, which represents each of the six students having 5 pets at home. Explain that each  $x$  on the plot represents one student. Confirm that this set of data has a mean of 5 by using the mean formula.
- Direct students' attention to the next line plot. Have students determine the mean of this data.  
*Does this data set also have a mean of 5? Yes*



**If students are confused, guide them through the application of the mean formula. Explain that each  $x$  on the line plot defines one of the numbers in the sum.**

- Read through the next paragraph with students. Emphasize that four of the students have 5 pets at home, and the other two students are balanced out on either side of this number. Explain that the data is balanced around 5, so 5 is the mean.
- Direct students' attention to the next line plot.  
*Prove that this data also has a mean of 5.*  

$$2 + 3 + 3 + 4 + 8 + 10 = 30$$

$$30 \div 6 = 5$$
*Thus, the mean of this data set is 5.*
- Read through the paragraph with students, emphasizing that the mean can be 5 even when none of the data points is equal to 5.



**Students may be confused how a number can be a balance point when none of the data points is equal to the number. Explain using an example. For instance, if a waiter were carrying pizzas on a long tray, and the pizzas were arranged on the tray according to the line plot above, the waiter would have to hold the tray at the 5 mark in order to balance it.**

- Direct students' attention to the last line plot, and guide them through the problem. Students may come up with many different answers. Have students discuss their answers, and point out that in all correct answers, the new  $x$ 's are balanced around 5.



## SHOW TIME

### INDEPENDENT PRACTICE

approximately 20 minutes

**Have students complete the Independent Practice activity in pairs or small groups.**

- Have students turn to page 83 (T133).
- Read the directions aloud and be sure that students understand the activity.

**Give students approximately 15 minutes to complete the activity.**

- As students work, circulate and ask them to explain their thinking. Redirect students as needed by asking them questions about their work. Effective questions might include the following:

*How many numbers are in the data set?*

*What is the sum of the numbers in the data set?*

*Are you sure you have included each number once?*



**Encourage struggling students to write each number separately, and cross numbers out as they are added to the sum.**

- Bring the class together and have students share their responses.
- Have students explain how the concept of mean as a balance point helped them understand the problems, and share the strategies they used to solve the problems.

### Independent Practice Answers

1) 1500

$$\text{Sum} \div 20 = 75$$

$$\text{Sum} = 75 \times 20 = 1500$$

2) 18

$$(38 + 36 + 8 + 6 + 2) \div 5 = 90 \div 5 = 18$$

3) 23

$$(43 + 41 + 13 + 11 + 7) \div 5 = 115 \div 5 = 23$$



**Students may notice that the mean age has grown by 5, the same amount by which the individual ages have grown. Explain that when all of the ages shift upward by 5, the balance point shifts upward with them.**

4) 28

$$(48 + 46 + 18 + 16 + 12) \div 5 = 140 \div 5 = 28$$

5) 93  
 $((8 \times 100) + (1 \times 60) + (1 \times 70)) \div 10 =$   
 $(800 + 60 + 70) \div 10 = 930 \div 10 = 93$

6) 107 kilograms  
 total weight of tackles  $\div 7 = 111$  kilograms  
 total weight of tackles  $= 111 \times 7 = 777$  kilograms  
 total weight of backfield players  $\div 4 = 100$  kilograms  
 total weight of backfield players  $= 100 \times 4 = 400$  kilograms  
 total weight of all players  $= 777 + 400 = 1177$  kilograms  
 mean weight of all players  $= 1177 \div (7+4) = 1177 \div 11 = 107$  kilograms



**If students are uncertain of how to solve this problem, suggest that they organize the information they know into mean formulas. Students should realize that they can manipulate the mean formulas to find the total weight of the tackles and the total weight of the backfield players. This information can be combined into a formula for the mean weight of all the players.**



**RAVE REVIEWS**  
 REFLECTION & ASSESSMENT

**Formal Assessment**

- Review students' work from the Independent Practice section of the lesson. Focus on how students compute the mean of data sets.

**Informal Assessment**

- As students engage in classroom discussion, note how successfully they demonstrate an understanding of mean as a balance point.

**Journal Prompt**

- Have students respond to the following prompt: "Could the mean of a set of scores ever be equal to the highest or lowest score? Explain your answer."



## ENCORE! ENCORE!

EXTENSION ACTIVITIES

### Quick Math

- Write the following problem and answer choices on the board. Give students two minutes to solve the problem. Model the correct method of solving the problem, and discuss the errors that students may have made.

1. Reggie scored 84, 88, and 95 points on his first three quizzes. How many points must he score, in total, on his remaining two quizzes in order to earn an average quiz score of 90 points?

- A 93
- B 103
- \*C 183
- D 193

### Math Project

- Have students measure the head circumference of their classmates and collect the data in a table, rounding to the nearest inch. Instruct students to display the data in a line plot, and calculate the mean head circumference of the class. Present the following question: "A regulation basketball has a circumference of 29.5 inches. Based on the data you have collected, is the average human head larger or smaller than a basketball?"

### Reteaching

- Make a list of students' ages, and have students predict the average age of the class. Present the formula for mean. Since all students' ages probably fall within two or three years, ask students if they can think of a simpler way to calculate the mean than adding all of the ages individually. Students should realize that they can multiply each age by the number of students that match it, then sum these products and divide by the total number of students in the class. Guide students through the calculation of the mean, and check to see whose prediction was closest. Finally, have students calculate the mean age of everyone in the class including the teacher, to show how an outlier affects the mean.



Name \_\_\_\_\_ Date \_\_\_\_\_

## Mean

CA Content Standard 6SDAP1.1: Compute the range, mean, median, and mode of data sets.



### SETTING THE STAGE OPENING ACTIVITY

Two students are arguing over who is on the taller basketball team. The table below lists the heights, in inches, of the players on the two teams.

Team 1	Team 2
64	69
70	60
66	70
64	70
75	62
64	71
73	65
67	70
64	66
66	67

- How could you help the students settle their disagreement?

Name \_\_\_\_\_

Date \_\_\_\_\_



**DRESS REHEARSAL**  
INSTRUCTION & GUIDED PRACTICE

**VOCABULARY TERMS**

**Data:** Information about a situation, group, or event

**Mean:** The average of a set of numbers

**INTRODUCTION**

Instead of comparing every player on each team to every player on the other team, you can compare two data sets by using the average height of each team. The average, or mean, takes all the heights into account.

To find the mean height of the players on Team 1, first add the heights of all the players.

$$64 + 70 + 66 + 64 + 75 + 64 + 73 + 67 + 64 + 66 = 673$$

Next, divide the sum by the number of players on the team.

$$673 \div 10 = 67.3$$

This is the mean height of the players on Team 1.

The steps involved in calculating the mean can be written as a formula.

$$\text{mean} = \frac{\text{sum of all terms}}{\text{total number of terms}}$$

Use this formula to calculate the mean height of the players on Team 2.

- How many players are on Team 2?
- What is the sum of the heights of the players on Team 2?
- Use the mean formula to find the mean height of the players on Team 2.
- Now compare the means. Which team is taller, on average?

Name \_\_\_\_\_

Date \_\_\_\_\_

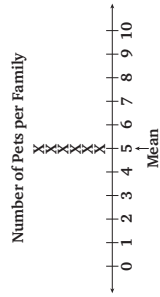


**DRESS REHEARSAL**  
(continued)

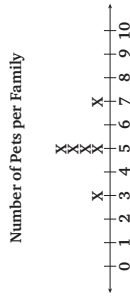
**Understanding the Mean as a Balance Point**

If a student surveys 6 classmates and reports that the mean number of pets they own is 5, does this mean that all six students have 5 pets each? Explain.

Below is a visual representation of one set of data the student may have collected, with a mean of 5.




Examine the distribution below.



- Does this data set also have a mean of 5? Notice that one response is two units to the left of the mean and another response is two units to the right of the mean. These two responses balance each other out, and the mean remains in the middle. In this example you can think of the mean as a balance point.


Name \_\_\_\_\_ Date \_\_\_\_\_



**DRESS REHEARSAL**  
*(continued)*

Look at the data below.

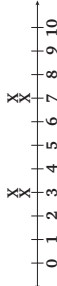
Number of Pets per Family



- Prove that this data also has a mean of 5.  
In this example, even though none of the students has 5 pets, the points still balance around 5.


Examine the distribution below.

Number of Pets per Family



- Place two more x's on the plot above so that the mean remains 5.

Name \_\_\_\_\_ Date \_\_\_\_\_



**SHOW TIME**  
INDEPENDENT PRACTICE

- Twenty students took a math exam, earning a mean score of 75. What is the sum of the 20 exam scores?
- The names and ages of each person in a family of five are given in the table below.
 

Name	Art	Layla	Kirk	Candace	Lily
Age	38	36	8	6	2

What is the mean age of the family members?
- What will the mean age be 5 years from now?
- What will the mean age be 10 years from now?
- Ten students took a math exam. Eight students scored 100, one student scored 60, and one student scored 70. What is the average score?
- If the mean weight of the 7 tackles on a football team is 111 kilograms, and the mean weight of the 4 backfield players is 100 kilograms, what is the mean weight of all 11 players?