

# What Does It Mean?

**Reporting category** Probability and Statistics

**Overview** Students find the median, mode, range, and mean of a set of class data.

**Related Standard of Learning** 5.19

## Objectives

- Students will find mean, median, range, and mode.
- Students will use a variety of graphs to represent data.

## Prerequisite Understandings/Knowledge/Skills

- Students must know how to create a bar graph.
- Students must know how to make predictions.
- Students must know how to put numbers in numerical order
- Students must know the concept of central tendency.

## Materials needed

- Linking cubes (counting chips, beans or any other small items may be substituted)
- Sticky notes
- “Recording Sheet,” one copy for each student

## Instructional activity

1. Have students predict how many linking cubes they can grab from a bag, using one hand. Have them record their predictions on their handouts. Record the class predictions on the overhead.
2. Have each student grab a handful of linking cubes from the bag and record the number on their sheet. Record the class totals on the overhead.
3. Have each students record his or her number on a sticky note. Have students place their sticky notes on the blackboard from least to greatest. Put sticky notes with the same number in a row to form a bar. Use this to make a bar graph. Discuss the elements that must be included in a bar graph.
4. Have each student connect his or her cubes to build a tower of cubes.
5. Have the students line up at the front of the room with their tower of cubes in hand. Have the student with the smallest number first in line. Then continue across the room in numerical order. Students should line up in front of each other when they have the same number of cubes. This human bar graph should be similar to the bar graph on the board.
6. Lead the group in a discussion of the measures of central tendency and range. Define *range* as the difference in the largest and smallest pieces of data. Have the first person in line and the last person in the line move to the middle and compare their stacks of cubes. What is the difference in the two stacks? Record this number as the range of the class data.
7. Define *mode* as the number that occurs most often. Lead students to discover that the longest line will be the mode. Count if necessary to determine the longest line. Have those students hold up their sticky notes. Record this number as the mode of the class data. There is the possibility of having more than one mode.

8. Define *median* as the middle number in a group of data that is arranged from smallest to largest or largest to smallest. Have the students discuss how to find the middle of their data. Have students take the hands of the students beside them and then spread out and form one long line. Then have the first person and last person in the line sit down. Continue this process until there are one or two people left standing. If there is only one person left standing have him hold up his sticky note and record this as the class median. If two people are left standing, have them use their cubes to find the number exactly in the middle of the two of their stacks. This will be the median.
9. Discuss *mean* and help students understand what it really tells us. Encourage students to share ways they could find the mean using the cubes. Have students share linking cubes with each other until they all have a similar number of cubes. They should share until sharing anymore is not helpful to reach the same number of cubes for each student. More than likely two groups will exist. Some students will have stacks of one number and the other group will have stacks with one more cube. At this point discuss *mean* and also use the term *average*.
10. Have students go back to their seats and record the measures of central tendency on their sheets. Review each of the four terms.

### **Sample assessment**

- Observe the students as they move through the classroom activity. Put students in groups of five. Have them each record the number of people living in their home. Have the group try to find the range, mode, median and mean of their data. Circulate and observe the students interaction. Answer any questions as necessary.

### **Follow-up/extension**

- Have students keep track of the number of hours of television that they watch each day for a week. Figure the mode, mean, median, and range of this data. Do the measures of central tendency vary? If they vary greatly, extend the project for 30 days.
- Give students baseball cards and have them determine the player's batting average (mean).
- Each student is given a small pack of M&Ms™ or Skittles™. Make a table of data for various colors of candy in their packages. Find the mean, mode, range, and median for each color.
- Construct paper airplanes, throw the planes a given number of times, and record the distances the planes fly. Find the mean, mode, median, range for the data.

### **Specific options for differentiating this lesson**

#### **Technology**

- Provide a big spoon or scoop to help students get cubes from a bag.
- Recreate the Recording Sheet as a template on the computer using a word processing program so some students can type in their responses.
- Enlarge the Recording Sheet on the computer or on a copy machine.
- Recreate the Recording Sheet as a template in Word and provide drop-down menus with the definitions of “range of data” line, “mode(s) of the data” line, “median of the data” line, and “mean of the data” line for clarification while students are trying to complete the data included in the sheet.
- Provide a talking word processor with word prediction to help students complete the definition section of the Recording Sheet.
- Create step-by-step directions in words and picture symbols for each section of the instructional activity.

- Consider providing students with a variety of calculators (e.g., talking).

### **Multisensory**

- Use recorded instructions and write the steps on a list for students to check off as each task is completed.
- Have students use mnemonic devices for support with vocabulary instruction.
- Color-code words along with their meanings on an organizer.
- Provide visual illustrations where appropriate. Have students represent data in different formats.

### **Community Connections**

- Invite a meteorologist to discuss average, predictions, and mean.
- Invite a sports statistician, law enforcement representative, Department of Transportation worker, or marketing advertising representative to discuss how probability and statistics are used in their jobs.

### **Small Group Learning**

- Take the class to a sporting event and collect statistical data to identify mean, median, mode, and range. In groups, have students determine mean, median, mode, and range of ages.
- Have students collect data regarding school lunch selections. Then present a report of findings to cafeteria manager explaining probability of lunch preferences.

### **Vocabulary**

- Students need to know the following vocabulary: median, mode, range, mean, predict, central tendency, compare and range.
- As appropriate, use a word wall, math glossary, index cards with words labeled, and create a song or rap using words.

### **Student Organization of Content**

- Use folders, chart, desk charts, record sheets, clipboards, color-coded tabs on folders, and graphic organizers.

## Recording Sheet

Name \_\_\_\_\_

Estimation \_\_\_\_\_

Actual number of cubes I grabbed in one handful \_\_\_\_\_

Number of students in class \_\_\_\_\_

Total number of cubes grabbed by class \_\_\_\_\_

Range of the data \_\_\_\_\_

Mode(s) of the data \_\_\_\_\_

Median of the data \_\_\_\_\_

Mean of the data \_\_\_\_\_

Write a definition for the following terms:

Range \_\_\_\_\_

Mode \_\_\_\_\_

Median \_\_\_\_\_

Mean \_\_\_\_\_