

## SESSION SIX EXPLORING THE MEAN

### Outcomes

- To review median and learn the meaning of mode
- To experience use of numerical and categorical data in a chart
- To consider the meaning of "typical" in the context of numerical and categorical data
- To learn how to construct a line plot graph

### Overview

This session explores the concept of the mean of a set of data. They will examine sets of data to determine the mean, median and mode. They discuss which measure of central tendency best describes the average.

### Time

- 15 minutes** Participants share their homework experience with their group. They share some of the questions that they developed with their children.
- 50 minutes** In this activity, participants discover the mean of the length of their last names by using manipulatives.
- 55 minutes** Participants examine data of salaries from a company, organizing it into a box and whiskers plot, and determining the mean, median and mode of the distribution. A typical salary is discussed. Participants will examine the mean, median and mode and will discuss which measure of central tendency best describes the typical salary average.

### Materials

Facilitator	Transparencies (English & Spanish)
	<i>BLM 28.1-2: Bringing Mathematics Home 5</i> <i>BLM 30: M &amp; M Problem</i> <i>BLM 31: Company Salaries</i>
Participant	Handouts (English & Spanish)
<ul style="list-style-type: none"> <li>• Calculators</li> <li>• Grid chart paper and marker, one per person</li> <li>• Graph paper</li> <li>• Blank paper</li> <li>• Colored pencils</li> <li>• Colored Tiles - about 30 per group</li> <li>• 2 x 2 squares, 10 per participant (made from BLM 29)</li> </ul>	<p><b>Copy on color cardstock</b>  <i>BLM 29: 2 x 2 Squares</i></p> <p><b>One per participant for class</b>  <i>BLM 32: Questions for Company Salaries</i></p> <p><b>One per participant for home</b>  <i>BLM 33: Bringing Mathematics Home 6</i></p>

**Activities**

Preparation of Classroom	Notes
<ol style="list-style-type: none"> <li>1. Prepare 2"x2" squares of construction paper for the activity involving number of letters in last names.</li> <li>2. Set up the Chart It!</li> <li>3. Place the name cards from the last class near the front of the room where participants can easily find them.</li> </ol>	
Discussion of Homework (15 minutes)	
<p>Display BLM ? Bringing Mathematics Home 5 Graphs. Have participants share what they discovered from the graphs and some of the questions that they developed with their children.</p>	
Developing the Concept of the Mean (50 minutes)	
<ol style="list-style-type: none"> <li>1. Tell participants that last week they used Unifix Cubes for the mode and median. This week they will use squares of paper to approximate the mean.</li> <li>2. Model writing your last name on the squares, using one square for each letter. Have participants write the letters of their last name on squares.</li> <li>3. Ask participants to look for people who have at least 2 more squares than they have and share their squares so that they are as close to even as possible.</li> <li>4. Have participants check to see that they have the same number of squares as everyone else and collect the extra squares that are left over on a table. Determine the mean number of squares by:             <ol style="list-style-type: none"> <li>a) Case 1: If everyone has the same number of squares with no leftovers, that number of squares is the mean.</li> <li>b) Case 2: When there are leftovers on the table, the mean is slightly more than the number of squares that everyone has. The leftovers will have to be divided, and the group can decide how to do that. Do they tear them in halves? Fourths? Etc.? When everyone has the same share, that share is the mean.</li> </ol> </li> <li>5. Ask participants: <i>If our mean is 7, what does that mean?</i></li> </ol>	

**Activities**

Developing the Concept of the Mean (continued)	Notes
<p>6 Display the following <b>M&amp;M Problem</b> on the overhead, and discuss with the class.</p> <p><i>Tanisha has 9 M&amp;Ms, Julio has 5 M&amp;Ms, and Liu has 7 M&amp;Ms.</i></p> <ul style="list-style-type: none"> <li>• <i>How can you find the amount of M&amp;Ms each would have if they decide to share equally?</i></li> <li>• <i>Can you do it without pencil and paper?</i></li> </ul> <p>7. Have a volunteer explain how they did this problem without paper and pencil. Ask:</p> <ul style="list-style-type: none"> <li>• <i>How would you define the mean in your own words.</i></li> <li>• <i>Do all sets of data have a mean?</i> (No, only sets of numerical data; there is exactly one mean. Remind them of the types of shoes that they did in the last session)</li> <li>• <i>Is there more than one mean to a set of data?</i></li> </ul> <p>8. Tell participants that they have developed the mean through an equal sharing process, but there is another process that is more of a calculation. Take them through the physical steps of adding and dividing by:</p> <ol style="list-style-type: none"> <li>Having each group get out 9 tiles for Tanisha, 5 for Julio and 7 for Liu (one person from the group represents each student).</li> <li>In order to share, they put their tiles in one big pile. A different person divides the tiles into three equal piles, one pile for each student.</li> </ol> <p>9. Have the participants record mathematically what they just did to find an equal share for each student. Record these steps on <b>Chart It!</b></p> <p>10. Show participants how to find the mean using the calculator: Find the sum and divide by the number of items that are added.</p> <p>11. Refer back to Chart 2 from the previous week. Find the mean number of soda cans that they drink each week.</p>	<p>The mean is 7.</p> <div data-bbox="1133 520 1349 848" style="border: 1px solid black; padding: 5px; margin: 10px 0;">  <p>Mean: Total number of pieces of data divided evenly.</p> <p style="text-align: right; color: blue;"><b>Chart It!</b></p> </div> <div data-bbox="1133 1163 1349 1507" style="border: 1px solid black; padding: 5px; margin: 10px 0;">  <p>Steps to find the mean: 1. Add all the tiles (numbers) together. 2. Divide by the number of people (items)</p> <p style="text-align: right; color: blue;"><b>Chart It!</b></p> </div>
<b>Salaries (55 minutes)</b>	
<p>1. Display the <b>Company Salaries</b> transparency while passing out <b>Questions for Company Salaries</b>. Have volunteers read the parts of The head of the union, Ms. Ortiz, the head of the company, Mr. Reyes, and the sales clerk, Mrs. Smith. Ask:</p> <ul style="list-style-type: none"> <li>• <i>What is the best way to represent a typical salary for this company?</i></li> <li>• <i>Is everyone telling the truth?</i></li> </ul>	<p>Remind participants know that the measures of central tendency to consider are mean, median and mode.</p>

**Activities**

Salaries (continued)	Notes
<p>2. Ask participants to answer the following questions about the company in groups, then discuss with the whole group.</p> <ul style="list-style-type: none"> <li>Consider the salaries of all employees. What is the mean of their salaries? Mode? Median? Which measure of central tendency do you think accurately represents the typical salary of the employees? Explain.</li> <li>If the salaries for just union members are counted, what is the mean? Mode? Median? Which measure of central tendency do you think accurately represents the typical salary of union workers? Explain.</li> <li>Compare the two sets of measures. Which stayed the same? Which changed? Why?</li> <li>Which measure of central tendency did Mr. Reyes use as his “average” salary at the company?</li> <li>Which measure of central tendency did Mrs. Smith use when she said most workers make \$15,000 at the company?</li> <li>Which measurement do you think best describes the typical salary in this company? Why?</li> </ul> <p>3. Ask participants to use the data from the salary table to make a box and whiskers plot. Have a group share their graph. Ask them:</p> <p><i>What would be the advantage of organizing information in this way?</i></p>	<p><b>All employees:</b> Mean: \$22,800 Mode: \$15,000 Median: \$13,500</p> <p><b>Union employees:</b> Mean: \$13,073 (rounded) Mode: \$15,000 Median: \$13,500</p> <p><b>Stayed the same:</b> Mode and median <b>Changed:</b> Mean <b>Why:</b> Because the 4 highest salaries were not included in the union employees.</p> <p>Mr. Reyes used mean.</p> <p>Mrs. Smith used the mode.</p> <p>When a set of data has some extreme high or low values, these distort the mean. In this case, the median is a better indicator of central tendency.</p>
Closure (5 minutes)	
<p>Ask the participants:</p> <p><i>What did you discover about measures of central tendencies today?</i></p>	
Take Home Activities (5 minutes)	
<p>Handout the home assignment and explain:</p> <p><b>Bringing Mathematics Home 6.</b></p>	
Preparation for the Next Session	
<p>1. Collect name cards for use in the next sessions.</p> <p>2. Save the <b>Chart It!</b> and bring them to the next class. If desired, you may have the log typed and distributed to participants at the next class.</p>	