

Activity 6.10B

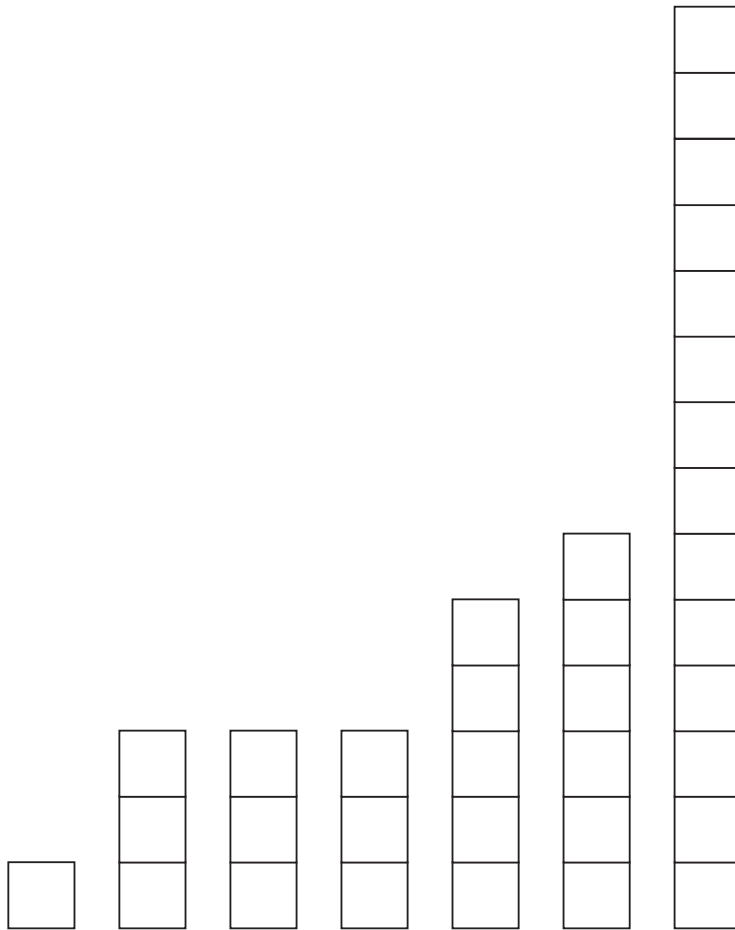
Connections to the mathematics TEKS

(6.10) The student uses statistical representations to analyze data.

The student is expected to:

(B) use median, mode, and range to describe data

Students use concrete objects and pictorial models to investigate and identify the mean of a data set. For example, students are told that when asked about how many pets they have, seven families reported the following numbers: 1, 3, 3, 3, 5, 6, and 14. Students represent the number of pets in each family with towers of Unifix cubes as shown on the following page.

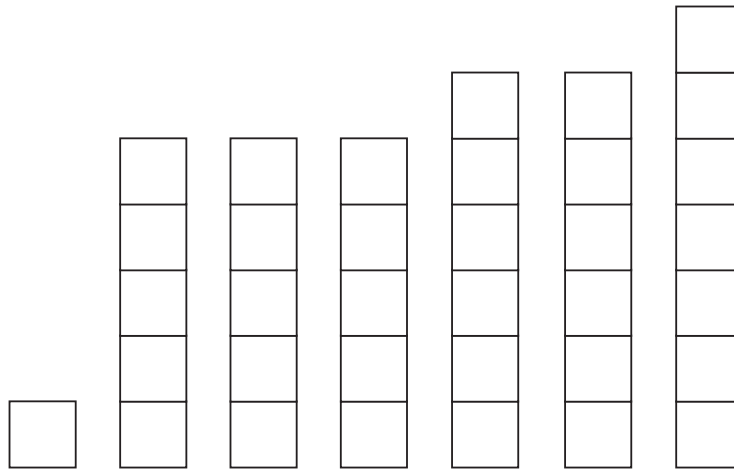


Ask students how they might redistribute the pets so that each family has the same number. Students disassemble the cubes and reassemble them into towers representing the same number of pets per family. The students discuss results and the processes that they used. [Note: Although students are not required to use an algorithm to find mean until grade 7, they may have had experience using a calculator to find mean, or they may share that they already know how to find mean. If so, you can ask them to relate their process to the algorithm for finding the mean of the seven data points for which one adds the number of pets and divides by the number of families.]

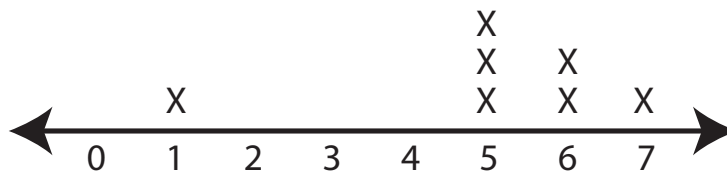
Students next investigate other data sets resulting from 35 cubes split over 7 towers. Their investigation leads them to the conclusion that each data set has a mean of 5.

These collections represent results that could have come from asking 7 families about the number of pets they own. Students discuss the number of pets as it relates to the towers.

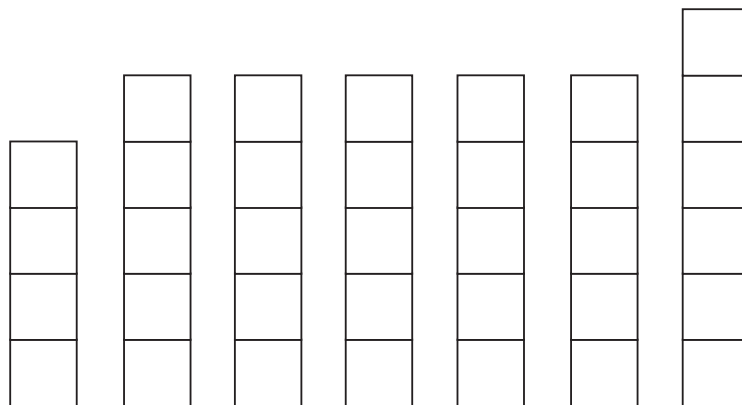
For example, one data set with a mean of 5 is



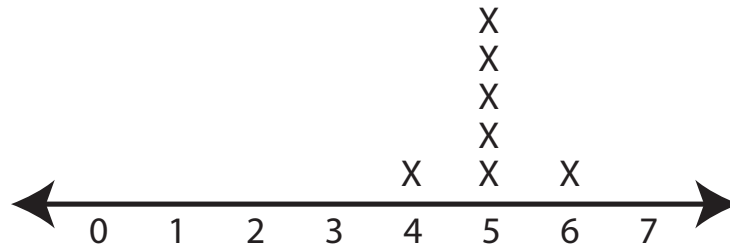
This collection of towers would represent seven families reporting 1, 5, 5, 5, 6, 6, and 7 as the number of pets they have. When guided, students create a line plot like the one below to show how many families have a specific number of pets.



Still another example of a collection with mean 5 could represent seven families reporting 4, 5, 5, 5, 5, 5 and 6 as the number of pets they have, as shown below.

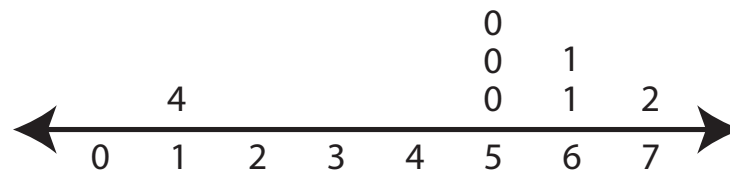


Students create a line plot like the one on the following page to show how many families have a specific number of pets for this data.

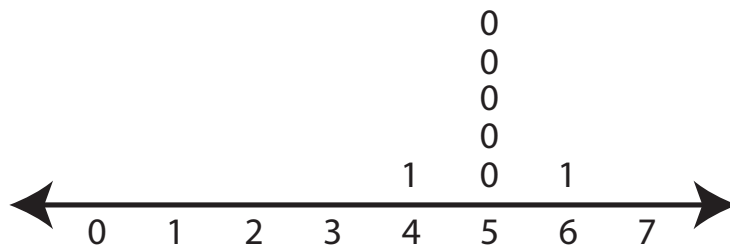


Students discuss which of the two examples of collections with mean 5 is closer to having an equal distribution. A way for students to start to consider which is closer to having an equal distribution is to count how many towers vary from the mean. In this context, how many families differ from the mean pet number of 5? Two families differ from the mean in the last example. Four families differ from the mean in the previous example.

Students then use the line plots to examine the idea of mean pictorially as a balance point. Students revisit the line plots and replace the Xs with numbers indicating how far above or below the mean the X is. For example 1, since the mean was 5, the tower with one cube was 4 cubes short, the towers with 6 cubes were 1 cube over, and the tower with 7 cubes was 2 cubes over.



For example 2,



The students notice that the sum of values below the mean is the same as the sum of the values above the mean in this embellished line plot. This will always be the case. Students note that for this reason, it is said that the distribution of the data will “balance” at the mean and the mean is thought of as the balance point of the distribution.

Questioning...

Open with...

How might we use concrete objects and pictorial models to examine the typical number of pets for these seven families?

Probe further with...

- Notice that the number of pets a family owns varies. What if we used all of the pets and tried to make all families have the same number, in which case there is no variability? How many pets would each family have?
- What is the mean number of pets a family owns? How do you know?
- In words, explain the algorithm that you can use to find the mean of a data set.
- (Optional for students who have prior experience finding mean with a calculator.) How does the process you used, combining all of the pets and then splitting them evenly among the families, relate to the algorithm for finding the mean?
- What if we know that the mean number of pets for seven families is 5? What are some different cube representations that might produce a mean of 5?
- Describe the number of pets each family had as represented by this collection of cube towers.
- In which collection does the number of pets vary more from the mean?
- How many pets does each family have based on the cube towers? How many families have no pets? How many families have one pet? Two? Three? Four? Five?
- Can you create a line plot to show how many families have a specific number of pets?
- What do you notice about the sum of the values below the mean and the sum of the values above the mean in this embellished line plot?
- Why might the mean be thought of as the balance point of the distribution?

Listen for...

- Does the student understand the notion of equal distribution for a set of numeric data?

- (Optional for students who have prior experience finding mean with a calculator.) Can the student apply the algorithm for finding the mean?
- Does the student recognize the relationship between modeling the action with concrete objects and applying the formula to find the mean?
- Can the student describe the number of pets each family has as represented by the cube towers?

Look for...

- Can the student create a line plot to show how many families have a specific number of pets?
- Does the student notice that the sum of the values below the mean is the same as the sum of the values above the mean in the embellished line plot?
- Can the student identify the mean given towers of cubes that represent the data?
- Can the students identify the mean given a line plot of the data?

TAKS Connections

Released TAKS items related to this activity can be found at the Texas Education Agency website (www.tea.state.tx.us):

- Spring 2003, grade 6, item 26
- Spring 2004, grade 6, item 13
- Spring 2006, grade 6, item 10

Extension Using Technology

Students can input data from this activity in their calculators or computer and then change one of the values and determine the effect of the change.