PROBLEM SOLVED
MAKING SENSE OF MATHEMATICS

Mean, Median, Mode (Part 2)
A Closer Look at the Video

After watching the *Mean, Median, Mode (Part 2)* video, make sense of the mathematics by reading through the problem situation and solution. Use the comments and questions in bold to help you understand mean, median, and mode.

A book club wants to describe the average number of books a club member reads in one month. Club members each kept track of the number of books they read during the month of April and analyzed their data to find the mean, median, and mode. Their results are shown below.

After-School Book Club	
Borrower's Name	**Books Read**
Andre	12
Tom	9
Jess	5
Brandon	8
Shelley	4
Ashley	9
Alex	5
Meeka	6
Trevor	5

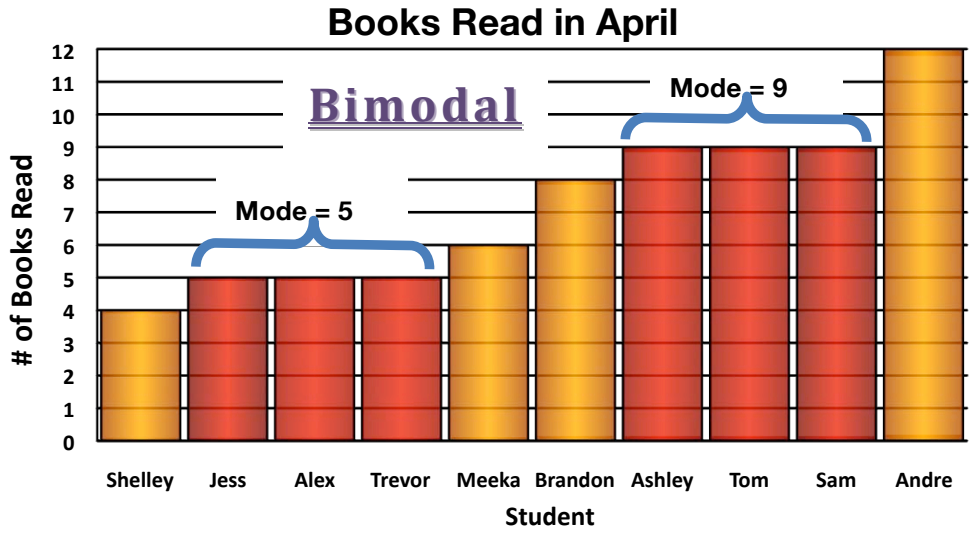
Mode = 5

Median = 6

Mean = 7

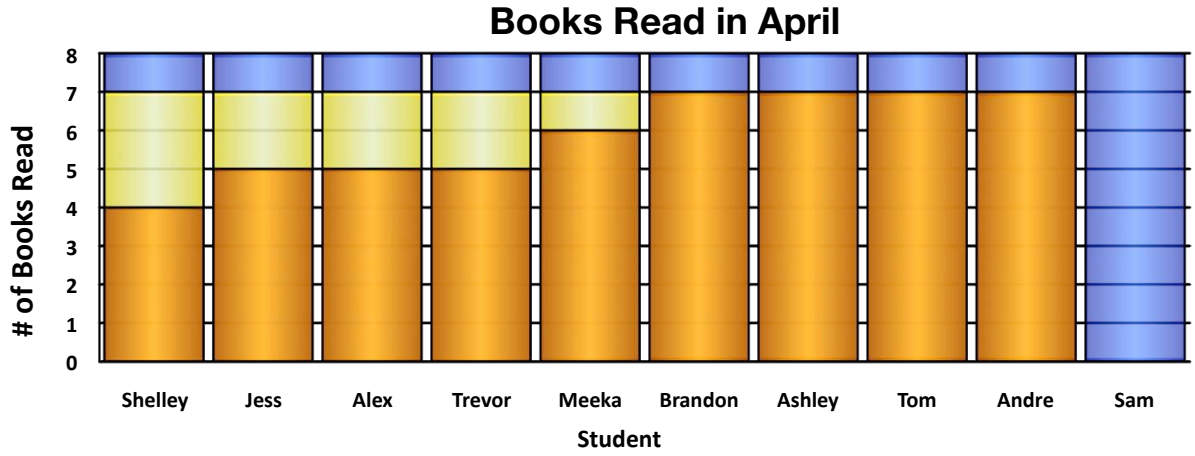
After computing these results, a new member, Sam, reported the number of books he read during the month of April.

Problem 1: Under what circumstances will Sam's data change the mode?
The mode is the number that occurs most often. It was 5 before we added Sam's books. The only way the mode will be different is if Sam read 9 books. Then three people would have read 5 books and three people would have read 9 books. In situations like this, there are two modes, and the data set is described as bimodal. Sam has read more than 9 books, so the mode will not change.



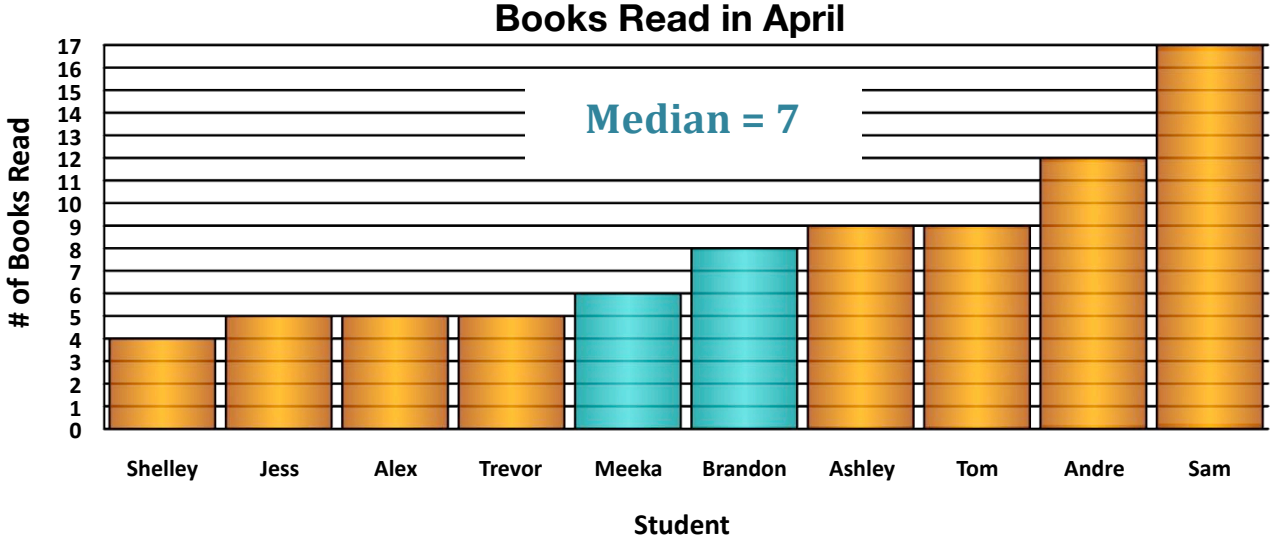
MakingSense

Problem 2: The club president recalculated the mean with Sam's books included and found that it increased from 7 to 8. Use this fact to find out how many books Sam read in April.
One way to determine the answer is to equalize. Since the new mean is 8, Sam must have read 8 books plus enough books to raise the mean (8 + 9 = 17 books).



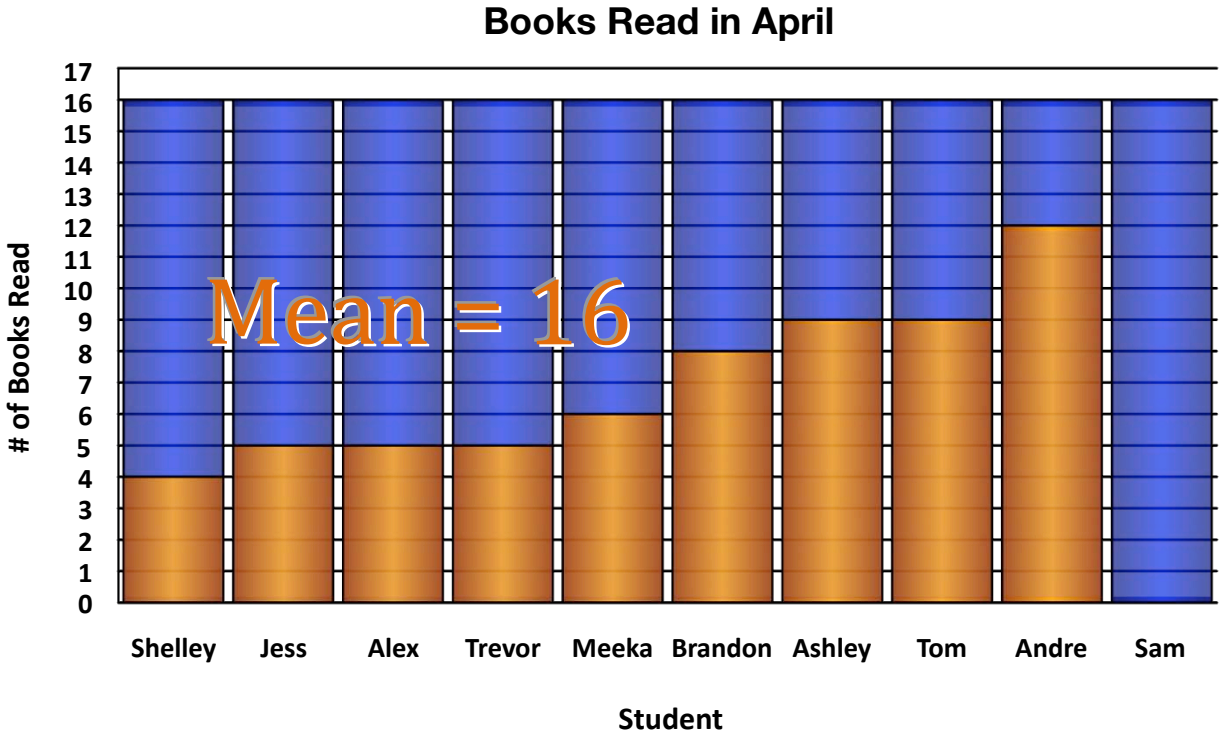
Here is a second way to view the problem. The club read a total of 63 books without Sam's books. With Sam, there are 10 club members and the mean is 8. So, the number of books read with Sam's books is 10 $\times$ 8, or 80. The old total is 63, and the new total is 80, so Sam read 17 books (80 – 63 = 17).

Problem 3: What is the median when you include Sam's books?
The median is the middle number in the distribution. When there were nine members, it was easy to find. We now have 10 members, so there is not a single middle number. When there is an even number of entries, the median is halfway between the two middle numbers. The two middle numbers are 6 and 8. Seven is halfway between 6 and 8, so 7 is the new median. The median does change when we add Sam's books.



Some data sets have an extreme value. In this example, 17 is an extreme value, also referred to as an outlier. Consider how an outlier impacts the mean, median, and mode of a data set.

Problem 4: If Sam had read 97 books rather than 17 books, how would that influence the mean, median, and mode?
The mode would not change because the most common number is still 5, and the median would not change because the two middle numbers are still 6 and 8. The mean would increase to 16 books.



Mode = 5 **Median = 7** **Mean = 16**

Problem 5: In this situation, which value – mean, median, or mode – is most representative of the number of books read by a typical club member? Explain your reasoning.
The outlier, 97, significantly increased the mean number of books read, so the mean no longer represents what is typical. The median better represents the number of books read by a typical club member. In other situations, the mean is more representative, so it is important to analyze all three values – mean, median, and mode – when evaluating data.