

Using Mean, Median, and Mode

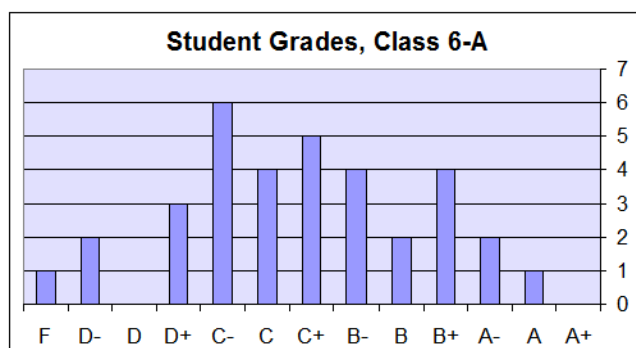
Example 1. The two bar graphs show the grades that two classes, 6-A and 6-B, got for science. Which class did better, generally speaking? Can you determine that just from the bar graphs?

You can probably figure out the answer just by looking at the graphs, but we can make sure by finding the median of both data sets. (We cannot find the mean because the data isn't numerical.)

To find the median, we list the students' grades from smallest to the greatest, using the graph.

For class 6-A :

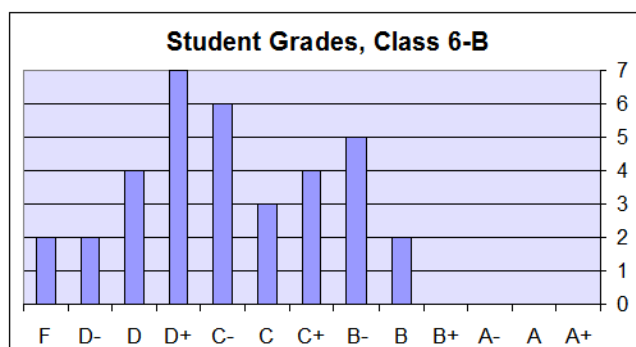
F, D-, D-, D+, D+, D+, C-, C-, C-, C-, C-, C-, C, C, C, C+, C+, C+, C+, C+, B-, B-, B-, B-, B, B, B+, B+, B+, B+, A-, A-, A.



Since there are 34 data entries, the exact middle one doesn't exist as such—both the 17th and 18th entries (C+ and C+) are equally “in the middle.” In such a case, the median is the average of those two. And while we cannot calculate the average when the data entries are not numbers, clearly the “middle point” of C+ and C+ is C+. So the median is C+.

For class 6-B, we have these 35 grades:

F, F, D-, D-, D, D, D, D, D+, D+, D+, D+, D+, D+, D+, C-, C-, C-, C-, C-, C-, C, C, C, C+, C+, C+, C+, B-, B-, B-, B-, B, B.



This time the middle item is the 18th, or C-.

Since the median for class 6-A is C+ and the median for class 6-B is C-, class 6-A did better on average. This can also be seen in the graphs: the bars in the graph for 6-B are more concentrated towards the left than in the graph for 6-A.

Example 2. Consider this data set: 3, 4, 4, 5, 5, 5, 5, 6, 8. Clearly, the median is 5, the mode is 5,

and the mean is $\frac{3 + 4 + 4 + 5 + 5 + 5 + 5 + 6 + 8}{9} = 5$.

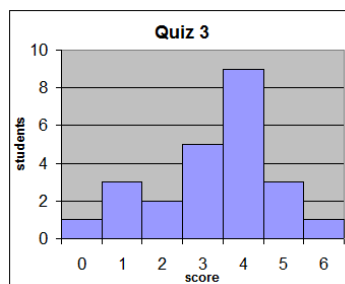
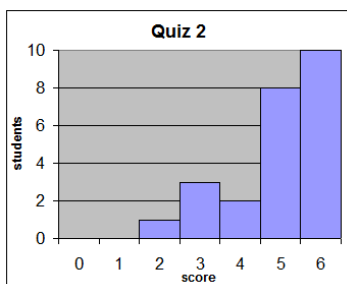
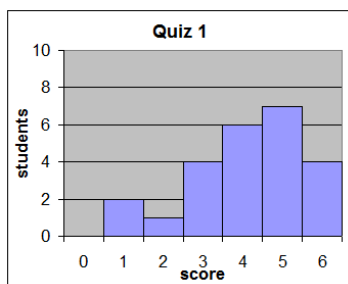
Now, let's say we add ONE more data item to the set (25). Perhaps this is a typing error, but it could also be a true data item, just very different from the others. Since it is very different from the other data points, it is called an **outlier**.

The data set is now 3, 4, 4, 5, 5, 5, 5, 6, 8, 25. How are mean, median, and mode affected by this one additional data item?

Mode is still 5. Median is still 5. But mean becomes $\frac{3 + 4 + 4 + 5 + 5 + 5 + 5 + 6 + 8 + 25}{10} = 7$.

In other words, mean was affected greatly by this outlier, whereas mode and median were not.

1. Mrs. Ross gave her students several quizzes in the calculus class. The graphs for the scores are below.



- Mrs. Ross felt one of the quizzes turned out too easy (the students didn't!). Which one?
- The mean scores for the three quizzes were: 3.29, 4.13, and 4.96. Match each mean with the correct graph.
- The median scores for the three quizzes were: 5, 4, and 4. Match each median with the correct graph.
- In which quiz did the students fare the worst?

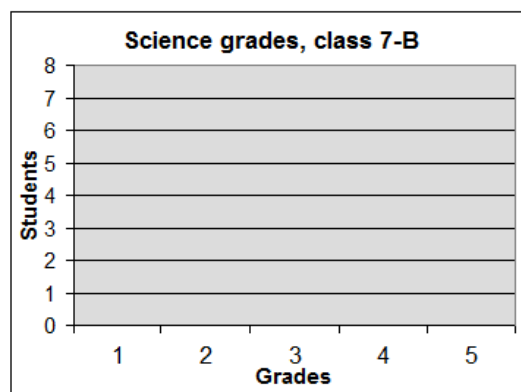
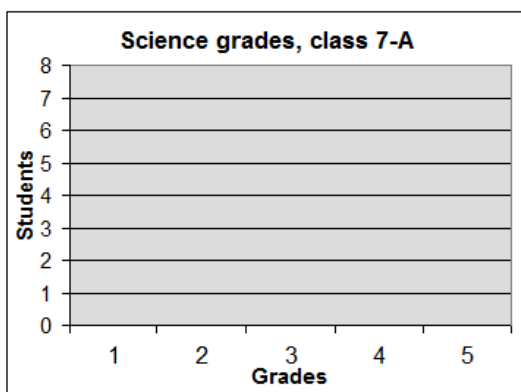
2. The following are the science grades of two 7th grade classes.

- Make bar graphs from the data.
- Find the mean, median, and mode for the grades of class A and class B.



Class 7-A	
Grades	Students
1	5
2	8
3	7
4	5
5	2

Class 7-B	
Grades	Students
1	3
2	6
3	7
4	7
5	4



Class A:
 mean _____
 median _____
 mode _____

Class B:
 mean _____
 median _____
 mode _____

- Determine which class did better. Explain your reasoning.