

Grade 8 Mathematics

Data Analysis, Probability, and Discrete Math:

Lesson 5

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol (\downarrow) by them.

Purpose of Lesson 5:

- In this lesson, the tutor and the students will
 - ✓ find the mean, median, mode, and range for a set of data.

Equipment/Materials Needed:

- Copies of Student Sheet 77
- Paper and pencils
- Chalkboard
- Calculators (optional)

Preparations before beginning Lesson 5:

- Run one copy of Student Sheets 77 for each student.
- Have paper and pencils available.
- If you are going to use calculators, borrow them from one of the teachers.

Lesson 5: Data Analysis

You may want to allow the students to use calculators. This way they can focus on the concepts, rather than on just the computation.

Say:

We are going to look at data and see whether we can find a way to describe the information. Suppose I gave a make-up test to 11 students yesterday. The test was worth 100 points. These were the scores on the test.

Write these scores on the board.

95, 85, 72, 96, 100, 78, 88, 88, 92, 84, 90

Say:

What could you say about the test scores if a score of 70 is passing? (All students passed the test; one student got a perfect score; etc.) Do you think you could describe the test scores more accurately if they were arranged in order? (Hopefully, they say yes.) To put them in ascending order, start with the lowest score. To put them in descending order, start with the highest score. Let's put the scores in ascending order.

72, 78, 84, 85, 88, 88, 90, 92, 95, 96, 100

Tell me some more things about the make-up test. (They may say things similar to this: the lowest score was 72 and the highest score was 100. Four students scored in the eighties and four students scored in the nineties. Two students scored 88.) If they mention the lowest and the highest scores, bring in the idea of range. **The range is the difference between the highest and lowest values, or in this case, 28 points.**

Say:

What is the typical grade scored by these 11 students? (Allow students to decide what the typical score would be.) In statistics, there are 3 ways to find the "typical" grade. The *mode* is the score that occurred most often. What is the mode for these test scores? (88) The *median* is the middle score. What score was in the middle? (There were 11 scores, so the middle score was the sixth score or 88.) Think: I have 11 scores, if I put 5 scores on each side, I would use up 10 scores. The sixth score is the middle score.

72 78 84 85 88 88 90 92 95 96 100

5 scores 5 scores

The *mean* is often called the *mean average* or just *average*. To find the mean, add all of the scores and then divide by the number of scores. What is the mean of these scores? (The mean score is 88.) In this problem, the mode was 88, the median was 88, and the mean was 88. Do you think this answer will always happen when we work with sets of data? (Actually, it is rare for the three measures to be the same.)

Say:

Suppose Roger scored 72 on the make-up test, but I knew he was very sick. I have decided to drop that grade. Now I have only 10 grades. Find the range, the mean, the median and the mode for the 10 test scores.

Answers: Range: 22 points
Mode remains the same: 88
The mean is now 89.6.
The median is the score halfway between the 5th and 6th score or 89. To find the median, add the two scores and divide by 2.
 $88 + 90 = 172$; $172 \div 2 = 89$

Note: You may want to give a few sets of numbers to help the students find the middle score or median.

Remember, on the LEAP test, if you forget which measure is which, the definitions are on the Reference Sheet.

] Give Student Sheet 77 to the students.

Answers:

1. Mean = 89 Median = 88 Mode = 98
I would take the mode, because it would give me a score of 98, which is the highest score.
2. Mean = 90 Median = 88 Mode = There is no mode.
I would take the mean, because it would give me a score of 90, which is the highest score.
3. Mean = 83 Median = 86 Mode = There is no mode.
I would take the median, because it would give me a score of 86, which is the highest score.
4. Mean = 87 Median = 86 Mode = 82
I would take the mean, because it would give me a score of 87, which is the highest score.

] Have one student summarize today's lesson. It is important that students know the differences in these measures of averages.

