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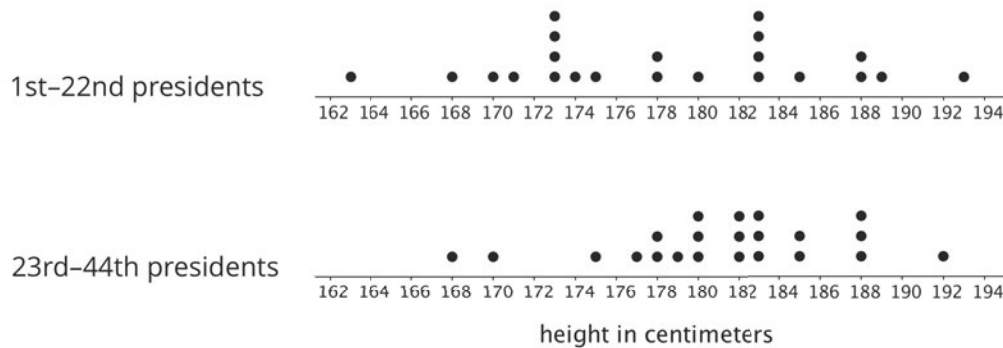
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# Unit 8, Lesson 14: Comparing Mean and Median

Let's compare the mean and median of data sets.

## 14.1: Heights of Presidents

Here are two dot plots. The first dot plot shows the heights of the first 22 U.S. presidents. The second dot plot shows the heights of the next 22 presidents.



Based on the two dot plots, decide if you agree or disagree with each of the following statements. Be prepared to explain your reasoning.

- The median height of the first 22 presidents is 178 centimeters.
- The mean height of the first 22 presidents is about 183 centimeters.
- A typical height for a president in the second group is about 182 centimeters.
- U.S. presidents have become taller over time.
- The heights of the first 22 presidents are more alike than the heights of the second 22 presidents.
- The MAD of the second data set is greater than the MAD of the first set.



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4. The world's smallest adult is 63 centimeters tall. Suppose that the world's tallest and smallest adults both joined your class.

a. Discuss the following questions with your group and explain your reasoning.

- How would the mean height of the class change from the original mean?
- How would the median height change from the original median?

b. Find the new mean.

c. Find the new median.

d. How did the measures of center—the mean and the median—change when these two people joined the class? Explain why the values of the mean and median changed the way they did.

### 14.3: Mean or Median?

1. Your teacher will give you six cards. Each has either a dot plot or a histogram. Sort the cards into *two* piles based on the distributions shown. Be prepared to explain your reasoning.
2. Discuss your sorting decisions with another group. Did you have the same cards in each pile? If so, did you use the same sorting categories? If not, how are your categories different?

Pause here for a class discussion.

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3. Use the information on the cards to answer the following questions.
- Card A: What is a typical age of the dogs being treated at the animal clinic?
  - Card B: What is a typical number of people in the Irish households?
  - Card C: What is a typical travel time for the New Zealand students?
  - Card D: Would 15 years old be a good description of a typical age of the people who attended the birthday party?
  - Card E: Is 15 minutes or 24 minutes a better description of a typical time it takes the students in South Africa to get to school?
  - Card F: Would 21.3 years old be a good description of a typical age of the people who went on a field trip to Washington, D.C.?
4. How did you decide which measure of center to use for the dot plots on Cards A–C? What about for those on Cards D–F?

### Are you ready for more?

Most teachers use the mean to calculate a student's final grade, based on that student's scores on tests, quizzes, homework, projects, and other graded assignments.

Diego thinks that the median might be a better way to measure how well a student did in a course. Do you agree with Diego? Explain your reasoning.

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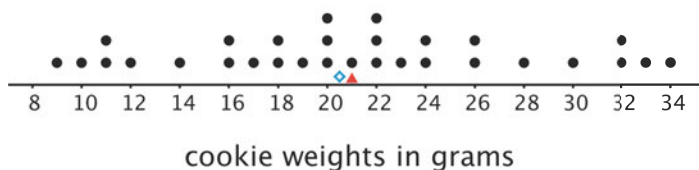
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## Lesson 14 Summary

Both the mean and the median are ways of measuring the center of a distribution. They tell us slightly different things, however.

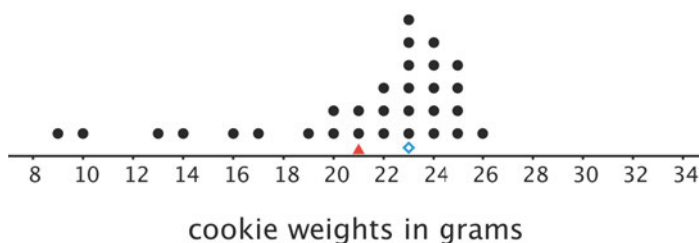
The dot plot shows the weights of 30 cookies. The mean weight is 21 grams (marked with a triangle). The median weight is 20.5 grams (marked with a diamond).



The mean tells us that if the weights of all cookies were distributed so that each one weighed the same, that weight would be 21 grams. We could also think of 21 grams as a balance point for the weights of all of the cookies in the set.

The median tells us that half of the cookies weigh more than 20.5 grams and half weigh less than 20.5 grams. In this case, both the mean and the median could describe a typical cookie weight because they are fairly close to each other and to most of the data points.

Here is a different set of 30 cookies. It has the same mean weight as the first set, but the median weight is 23 grams.



In this case, the median is closer to where most of the data points are clustered and is therefore a better measure of center for this distribution. That is, it is a better description of a typical cookie weight. The mean weight is influenced (in this case, pulled down) by a handful of much smaller cookies, so it is farther away from most data points.

In general, when a distribution is symmetrical or approximately symmetrical, the mean and median values are close. But when a distribution is not roughly symmetrical, the two values tend to be farther apart.

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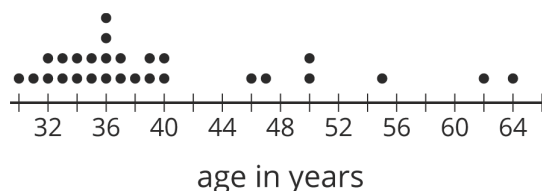
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## Unit 8, Lesson 14: Comparing Mean and Median

1. Here is a dot plot that shows the ages of teachers at a school.

Which of these statements is true of the data set shown in the dot plot?



- A. The mean is less than the median.
  - B. The mean is approximately equal to the median.
  - C. The mean is greater than the median.
  - D. The mean cannot be determined.
2. Priya asked each of five friends to attempt to throw a ball in a trash can until they succeeded. She recorded the number of unsuccessful attempts made by each friend as: 1, 8, 6, 2, 4. Priya made a mistake: The 8 in the data set should have been 18.

How would changing the 8 to 18 affect the mean and median of the data set?

- A. The mean would decrease and the median would not change.
  - B. The mean would increase and the median would not change.
  - C. The mean would decrease and the median would increase.
  - D. The mean would increase and the median would increase.
3. In his history class, Han's homework scores are:

100	100	100	100	95	100	90	100	0
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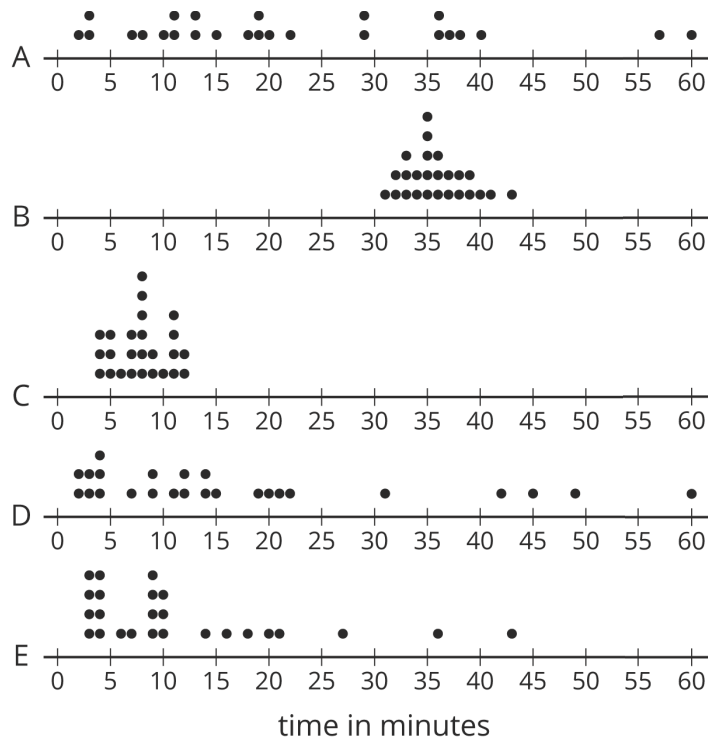
The history teacher uses the mean to calculate the grade for homework. Write an argument for Han to explain why median would be a better measure to use for his homework grades.

4. The dot plots show how much time, in minutes, students in a class took to complete each of five different tasks. Select **all** the dot plots of tasks for which the mean time is approximately equal to the median time.

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5. Zookeepers recorded the ages, weights, genders, and heights of the 10 pandas at their zoo. Write two statistical questions that could be answered using these data sets.

(from Unit 8, Lesson 2)

6. Here is a set of coordinates. Draw and label an appropriate pair of axes and plot the points.  $A = (1, 0)$ ,  $B = (0, 0.5)$ ,  $C = (4, 3.5)$ ,  $D = (1.5, 0.5)$

(from Unit 7, Lesson 12)