

Data Point Shake-Up

See how one value can move the mean and median.

GRADE 6 • 6.NR.2.6

6.NR.2.6 "Describe the impact that inserting or deleting a data point has on the mean and the median of a data set. Create data displays using a dot plot or box plot to examine this impact."

NAME _____

DATE _____

ONE VALUE CAN MATTER

When you insert or delete a data point, find the new sum and the new number of data points before finding the mean. Put the data in order to find the median again, because adding or removing a value can change the middle position.

WORKED EXAMPLE

Data set: 22, 26, 30, 34. Delete 34.
Find how the mean and median change.

1. Original sum: $22 + 26 + 30 + 34 = 112$.
2. Original mean: $112 / 4 = 28$. Original median: $(26 + 30) / 2 = 28$.
3. After deleting 34, the data are 22, 26, 30. The new sum is 78.
4. New mean: $78 / 3 = 26$. New median: 26.

Answer: The mean decreases from 28 to 26, and the median decreases from 28 to 26.

PRACTICE 6 problems

- 1** Data set: 3, 5, 7, 9. Insert 1. Find the original and new mean and median.

ANSWER _____

- 2** Data set: 2, 2, 5, 7, 11. Delete 11. Find the original and new mean and median.

ANSWER _____

- 3** Dot plot: 1: X, 2: XX, 3: X, 4: X. Insert one data point at 3. Find the new mean and median. State how each changed.

ANSWER _____

- 4** Create a dot plot for 1, 1, 3, 5, 5. Then insert 9. Find the new mean and median.

ANSWER _____

- 5** Data set: 1, 3, 3, 7, 9. Delete 9. Find the original and new mean and median.

ANSWER _____

- 6** Data set: 2, 4, 6, 8. Insert 5. Find the original and new mean and median. What do you notice?

ANSWER _____

APPLY IT Show your work

- 1** A robotics team records the number of practice rounds completed by four members: 12, 14, 16, and 18. A fifth member completes 20 rounds. Create a dot plot for all five values. Then find how the mean and median changed when the fifth value was inserted.

WORK SPACE

ANSWER _____

- 2** A gamer records five weekly scores in tens of points: 6, 9, 12, 15, and 18. The score of 18 tens of points is deleted. Find the original and new mean and median in both tens of points and points.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A data set is 2, 5, 7, 9, 13. One data point is inserted, and the new mean stays 7.2. What data point was inserted? Explain how the median changes.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Data set: 3, 5, 7, 9. Insert 1. Find the original and new mean and median.	Original mean: 6; new mean: 5. Original median: 6; new median: 5.
2	Data set: 2, 2, 5, 7, 11. Delete 11. Find the original and new mean and median.	Original mean: 5.4; new mean: 4. Original median: 5; new median: 3.5.
3	Dot plot: 1: X, 2: XX, 3: X, 4: X. Insert one data point at 3. Find the new mean and median. State how each changed.	The mean changes from 2.4 to 2.5, an increase of 0.1. The median changes from 2 to 2.5, an increase of 0.5.
4	Create a dot plot for 1, 1, 3, 5, 5. Then insert 9. Find the new mean and median.	Dot plot after insertion: 1: XX, 3: X, 5: XX, 9: X. The mean changes from 3 to 4, and the median changes from 3 to 4.
5	Data set: 1, 3, 3, 7, 9. Delete 9. Find the original and new mean and median.	Original mean: 4.6; new mean: 3.5. Original median: 3; new median: 3.
6	Data set: 2, 4, 6, 8. Insert 5. Find the original and new mean and median. What do you notice?	Original mean: 5; new mean: 5. Original median: 5; new median: 5. Neither measure changes.

PART 2 • APPLY IT

- Dot plot: 12: X, 14: X, 16: X, 18: X, 20: X. The mean changes from 15 rounds to 16 rounds, and the median changes from 15 rounds to 16 rounds.** The first four values have a sum of 60 and a mean of 15. After inserting 20, the sum is 80 for 5 values, so the mean is 16 and the middle value is 16.
- Original mean: 12 tens of points, or 120 points. Original median: 12 tens of points, or 120 points. New mean: 10.5 tens of points, or 105 points. New median: 10.5 tens of points, or 105 points.** The original total is 60 tens of points, which is 600 points, so the mean is 12 tens of points. After deleting 18 tens of points, the total is 42 tens of points, or 420 points, and both the mean and median are 10.5 tens of points.

CHALLENGE

The inserted data point is 7.2. The original median is 7. After insertion, the ordered data are 2, 5, 7, 7.2, 9, 13, so the new median is $(7 + 7.2) / 2 = 7.1$. The median increases by 0.1.

Accept equivalent decimal and fraction forms, such as 2.5 and $5/2$. For dot plots, accept any correctly spaced display that shows the correct number of marks at each value.