LESSON MAKER PRO

Balance Point Detectives

Track how one value can shift a data set.

GRADE 6 · 6.PS.2

6.PS.2 "The student will represent the mean as a balance point and determine the effect on statistical measures when a data point is added, removed, or changed..."

NAME _____ DATE _____

THE BALANCE POINT

The mean is the balance point of a data set. Adding or changing a value above the mean pulls the mean up, while a value below the mean pulls it down. An outlier is a value far from the pattern of the other values and can strongly affect the mean and range.

WORKED EXAMPLE

A line plot has one dot at 2, 6, 10, and 14. Find the balance point.

1. Add the values: 2 + 6 + 10 + 14 = 32.
2. Count the values: 4.
3. Divide: 32 / 4 = 8.

Answer: The balance point, or mean, is 8.

PRACTICE 6 problems

1 A line plot has one dot at 1, 3, 5, and 7. What number is the balance point?

ANSWER _____

2 The data set is 3, 4, 5, 5, 7. Remove 7. Does the median change? Give the old and new medians.

ANSWER _____

3 The data set is 1, 4, 4, 7, 9. Find the mean. Then add 12 and find the new mean.

ANSWER _____

4 The data set is 3, 3, 4, 5, 5, 7. Change 7 to 11. How do the mean and range change?

ANSWER _____

5 The data set is 4, 5, 5, 7, 23. Identify the likely outlier. How does it affect the mean, median, and range?

ANSWER _____

6 A dot plot has dots at 1, 4, 4, and 7. Change the dot at 7 to 11. What is the new balance point?

ANSWER _____

APPLY IT Show your work

1 Jay records pages read during four days: 9, 11, 13, and 15 pages. He adds a fifth day of 17 pages. Find the original mean and the new mean. Explain why the mean changes.

WORK SPACE

ANSWER _____

2 A coding club records the number of errors found in five test sessions: 4, 5, 5, 7, and 17. The value 17 is far from the other values. If it is removed, find the mean, median, and range before and after it is removed.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A line plot has one dot at 3, 5, 7, 9, and 11. Add one dot so the new balance point is 9. What value did you add? Then find the new median and range. Is the added value an outlier? Explain.

_____

_____

ANSWER KEY

Balance Point Detectives

GRADE 6 · 6.PS.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A line plot has one dot at 1, 3, 5, and 7. What number is the balance point?	**4**
2	The data set is 3, 4, 5, 5, 7. Remove 7. Does the median change? Give the old and new medians.	**Yes. The median changes from 5 to 4.5.**
3	The data set is 1, 4, 4, 7, 9. Find the mean. Then add 12 and find the new mean.	**Original mean: 5. New mean: 37/6, or 6 1/6.**
4	The data set is 3, 3, 4, 5, 5, 7. Change 7 to 11. How do the mean and range change?	**The mean changes from 4.5 to 31/6, or 5 1/6. The range changes from 4 to 8.**
5	The data set is 4, 5, 5, 7, 23. Identify the likely outlier. How does it affect the mean, median, and range?	**23 is the likely outlier. It pulls the mean up and makes the range much larger. The median stays 5.**
6	A dot plot has dots at 1, 4, 4, and 7. Change the dot at 7 to 11. What is the new balance point?	**5**

PART 2 · APPLY IT

1. **Original mean: 12 pages. New mean: 13 pages. The mean increases because 17 is greater than the original mean of 12.** Add the first four values to get 48, then divide by 4. Add 17 to get 65, then divide by 5.
2. **Before removal: mean = 38/5, or 7.6; median = 5; range = 13. After removal: mean = 21/4, or 5.25; median = 5; range = 3.** With 17 included, the total is 38. Without 17, the remaining values total 21, and the middle values still give a median of 5.

CHALLENGE

Add 19. The new median is 8, and the new range is 16. Yes, 19 is an outlier because it is far above the cluster from 3 to 11.

Accept equivalent fraction and decimal forms for means. For outlier explanations, accept responses that identify the distant value and correctly describe its effect on the mean, median, or range.