

Center Under Pressure

Choose measures that fit the data.

HIGH SCHOOL • MA.912.DP.2.1

MA.912.DP.2.1 "For two or more sets of numerical univariate data, calculate and compare the appropriate measures of center and measures of variability, accounting for possible effects of outliers..."

NAME _____

DATE _____

PICK THE RIGHT MEASURES

Use mean and range for data that are roughly symmetric with no outliers. Use median and IQR when an outlier pulls the mean or stretches the range. Describe shape as symmetric, skewed left or right, clustered, or showing gaps.

WORKED EXAMPLE

For 20, 24, 28, 32, 36, find the mean, median, and range.

1. Add: $20 + 24 + 28 + 32 + 36 = 140$.
2. Mean: $140 / 5 = 28$.
3. Median: the middle value is 28.
4. Range: $36 - 20 = 16$.

Answer: Mean = 28, median = 28, range = 16. The data are symmetric, so mean and range fit.

PRACTICE 5 problems

- 1** For 1, 2, 2, 3, 7, find the mean, median, and range.

ANSWER _____

- 2** For 9, 9, 11, 11, 13, 27, identify the outlier. Then give the best center and spread.

ANSWER _____

- 3** Set A: 1, 3, 3, 9. Set B: 2, 2, 5, 7. Find each mean and range. Which set is less variable?

ANSWER _____

- 4** Describe the shape of 1, 2, 3, 3, 9. Which center is better?

ANSWER _____

- 5** For 1, 3, 5, 7, 9, 11, 13, find Q1, Q3, and the IQR.

ANSWER _____

APPLY IT Show your work

- 1** Two esports teams recorded practice-match completion times, in minutes. Team A: 12, 13, 14, 15, 16, 17, 18. Team B: 1, 13, 14, 15, 16, 17, 29. Find the mean, median, and range for each team. Which team has more consistent times, and which measures should describe Team B?

WORK SPACE

ANSWER _____

- 2** Two students tracked video-export times, in minutes. Student X: 19, 21, 22, 23, 25. Student Y: 17, 21, 22, 23, 27. Find the mean and range for each student. Whose export times are more reliable?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Two creators tracked views, in hundreds, on seven posts. Creator A: 1, 3, 5, 7, 9, 11, 13. Creator B: 1, 3, 5, 7, 9, 11, 41. A student says Creator B has higher typical views because B's mean is higher. Is that fair? Explain using center, spread, outliers, and shape.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	For 1, 2, 2, 3, 7, find the mean, median, and range.	Mean = 3, median = 2, range = 6.
2	For 9, 9, 11, 11, 13, 27, identify the outlier. Then give the best center and spread.	Outlier = 27. Use median = 11 and IQR = 4.
3	Set A: 1, 3, 3, 9. Set B: 2, 2, 5, 7. Find each mean and range. Which set is less variable?	A: mean = 4, range = 8. B: mean = 4, range = 5. Set B is less variable.
4	Describe the shape of 1, 2, 3, 3, 9. Which center is better?	The distribution is skewed right. The median, 3, is the better center.
5	For 1, 3, 5, 7, 9, 11, 13, find Q1, Q3, and the IQR.	Q1 = 3, Q3 = 11, IQR = 8.

PART 2 • APPLY IT

- Team A: mean = 15, median = 15, range = 6. Team B: mean = 15, median = 15, range = 28. Team A is more consistent. For Team B, use median = 15 and IQR = 4 because 1 and 29 are outliers.** Both means are 15, but Team B's range is much larger. For Team B, Q1 = 13 and Q3 = 17, so IQR = 4 and the endpoints are outliers.
- Student X: mean = 22, range = 6. Student Y: mean = 22, range = 10. Student X has more reliable times.** The centers are equal, so compare variability. Student X has the smaller range.

CHALLENGE

No. Creator A has mean = median = 7 and range = 12. Creator B has mean = 11, median = 7, and range = 40. The 41 is an outlier, so B is skewed right and its mean is pulled up. The medians show the same typical number of views.

Accept equivalent wording for skewed right, such as a long right tail. Use the convention that the median is excluded when finding quartiles in an odd-sized data set.