L19 How Far From Average

Data Science · Cycle 2 · Guided notes

Name: _____

Date: _____ Period: _____

Spiral warm-up

1 From L17: 4, 6, 6, 8, 21.

Mean: _____ Median: _____

The _____ is an outlier.

2 From L18: Q1 is 10 and Q3 is 18.

IQR = Q3 − Q1 = _____

The middle _____ % of the values lie between 10 and 18.

The idea

The standard deviation (SD) is about how far a typical value sits from the _____.

Step	Do this
1	Find the _____.
2	Take the mean away from each value.
3	_____ each answer, so none is negative.
4	Add the squares.
5	Divide by n − 1, one less than _____.
6	Take the square root.

A small SD means the values are _____: close together.

Objectives

- Say why a center alone can hide what matters.
- Find a standard deviation by hand, with n − 1.
- Check it with =STDEV in Sheets.
- Say which group is more consistent from its SD.

Key words

spread: how far apart the values are

deviation: one value minus the mean

standard deviation (SD): about how far a typical value sits from the mean

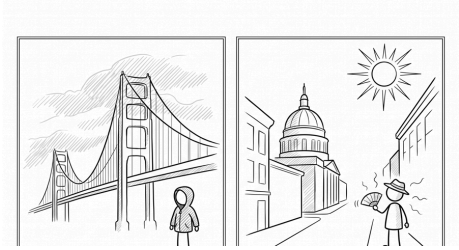
consistent: values close together: a small SD

n − 1: one less than the number of values; Sheets divides by it too

Examples

Example 1

Why it matters. San Francisco and Washington, DC, daily weather, 1995 to 2024 (NOAA).



	San Francisco	Washington
Average temperature	57.9°F	59.3°F
Average July high	67°F	89°F
SD of the daily highs	7.5°F	17.8°F

The centers are within _____ degrees. The SDs are not close.

Washington's SD is more than _____ San Francisco's.

Same center, different spread. Pack for the mean and you freeze in DC in January.

Example 2

Find the SD of 3, 7, 7, 9, 14.

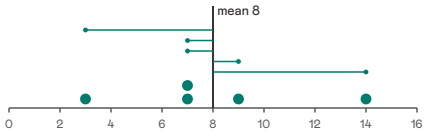
Mean: (3 + 7 + 7 + 9 + 14) ÷ 5 = _____ = _____

Value	Minus the mean, 8	Squared
3		
7		
7		
9		
14		
	Add	

Divide by n − 1 = _____ : _____ = _____

Take the square root: $\sqrt{16}$

SD = _____. A typical value sits about _____ from the mean.



Example 3

The same in Sheets. It divides by n − 1 too.

Sheets: `=STDEV(A1:A5)`

Sheets gives _____, the same as by hand.

Two hands: SD 2.6 cm and SD 5.5 cm. The _____ is more consistent.

Practice · Homework 5, due Monday 23 November, in Canvas

1 Find the SD of 4, 6, 8, 10, 12. You may need one of $\sqrt{8} \approx 2.83$, $\sqrt{10} \approx 3.16$, $\sqrt{12} \approx 3.46$.

SD = _____

2 Find the SD of 2, 4, 4, 6, 9. You may need one of $\sqrt{6} \approx 2.45$, $\sqrt{7} \approx 2.65$, $\sqrt{8} \approx 2.83$.

SD = _____

3 Team A scores 10, 10, 10, 10, 10. Team B scores 0, 5, 10, 15, 20.

Both means: _____. SD of Team A: _____

Without working it out, which team has the bigger SD? _____

4 Add 10 to each of 12, 15, 15, 18, 20. Their SD was 3.08.

New mean: _____ New SD: _____

5 A Sheet holds 4, 6, 8, 10, 12 in A1 to A5. What does `=STDEV(A1:A5)` show, to two places?

It shows _____, the SD from problem 1.

Does it divide by n or by n − 1? _____

6 Your own Cycle 1 data.

If your main column was a label or yes or no, use the count of it each week instead: how many sunny days, how many yeses.

My main column: _____

Were my values consistent, or spread out? How do I know? _____

_____

One reason my values spread out: _____