

Same Average, Different Class

Two classes took the same quiz. Everything about them looks identical — until it doesn't.

Name _____ Block _____ Date _____

PART A • THE TWO CLASSES

Below are quiz scores from two different sections of the same course, same quiz, same day.

Class A	76	80	82	84	84	84	88	90	90	92
Class B	60	65	70	84	84	84	98	100	100	105

Compute all four for each class. Show your work in the margin.

	Mean	Median	Mode	Range
Class A				
Class B				

1. What do you notice about the first three columns?

2. Mean, median and mode are the three measures of central tendency. If all three are identical, are these two classes the same? Explain.

3. You have to predict the next student's score. Which class would you rather predict from, and why?

THE PROBLEM

Central tendency told you where the middle is. It said nothing about how spread out the scores are — and that is the thing that actually differs here. You need a second kind of measure.

KEEP THIS IN VIEW WHILE YOU WORK

Measure	What it is	What it hides
Mean	Add every score, divide by how many	One extreme score drags it
Median	The middle score once they are in order	How far apart the scores are
Mode	The score that appears most often	Almost everything else
Range	Highest minus lowest	Uses only two scores of the whole set
Standard deviation	The average distance from the mean	Nothing much — this is the useful one

PART B · STANDARD DEVIATION — THE AVERAGE DISTANCE FROM THE AVERAGE

Range only uses two scores, so one unusual student controls it entirely. Standard deviation uses every score. Work Class A below.

Score	Score – Mean	(Score – Mean) ²
76		
80		
82		
84		
84		
84		
88		
90		
90		
92		
	Sum →	

Sum of squares ÷ 10 = _____ √ that = SD = _____

Class B’s standard deviation is 15.1. You do not need to compute it.

4. Write what standard deviation means in one sentence, without using the word “deviation.”

5. Class A’s SD is about 4.8. Class B’s is 15.1. Say what that difference means for a real classroom — not for the numbers.

PART C · ONE STUDENT CHANGES EVERYTHING (OR DOES SHE?)

A student in Class A was absent and takes the quiz cold. She scores 20. Add that score to Class A — now eleven scores — and recompute.

	Mean	Median
Class A, original	85	84
Class A, with the 20		
How much did it move?		

6. One score moved one measure a lot and the other barely at all. Which, and why does that happen?

7. A news story reports the “average” salary at a company as \$180,000. The CEO makes \$4 million. Which measure would tell you more about a typical employee, and why?

SKEW

A distribution stretched out by extreme scores on one side is skewed. The mean gets pulled toward the tail; the median mostly stays put. Positive skew means the tail points at the high numbers; negative skew means it points at the low ones.

PART D · THE NORMAL CURVE, AND WHERE YOU STAND IN IT

Many human measurements pile up in the middle and thin out at both ends — a normal distribution. Once you know the mean and the standard deviation, you know roughly what share of people fall where.

THE 68 – 95 – 99.7 RULE

About 68% of scores fall within 1 SD of the mean.

About 95% fall within 2 SD.

About 99.7% fall within 3 SD.

A standardized test has a mean of 100 and a standard deviation of 15.

	Between which two scores?	About what % of people?
Within 1 SD		
Within 2 SD		
Within 3 SD		

8. A student scores 115. Roughly what percentile is that — and how did you work it out from the rule above?

9. A score of 145 is how many standard deviations above the mean? Is that common or rare, and how do you know?

PART E · OUR CLASS

Using the numbers on the board from our own data:

Mean	Median	Mode	Range	SD

10. Is our distribution roughly normal, positively skewed, or negatively skewed? Point to the numbers that tell you.

CLOSER — HAND THIS IN

A. Name the three measures of central tendency and the two measures of variability.

B. You are given a data set with one extreme outlier. Which measure of central tendency would you report, and why?

C. Two studies both report a mean of 50. One has an SD of 2, the other an SD of 20. What is different about them?
