Mastering Basic Statistics

Mean, Median, Mode, & Range:
The ACT Score Booster Guide

Based on "The ACT Math Guide" by Irfan Mansuri

Why This Topic is "Free Money" on the ACT

High Frequency

Expect 5–8 questions per exam

Score Impact

Adds 2–4 points to composite score

Portion of Test

12–15% of Math Section

These are the fastest questions to answer. Secure these easy points first.

The Big Four: Quick Definitions

MEAN
The Average.
(Sum of values ÷ Number of values).

MEDIAN
The Middle.
(The value in the center when ordered).

MODE
The Most Frequent.
(The number that appears most often).

RANGE
The Spread.
(Highest value - Lowest value).

The Formula Cheat Sheet

MEAN

$$\text{Mean} = \frac{\text{Sum of all values}}{\text{Number of Count}}$$

MEDIAN STEPS

1. Arrange in ascending order (Crucial!).
2. Odd count: Pick the middle number.
3. Even count: Average the two middle numbers.

RANGE
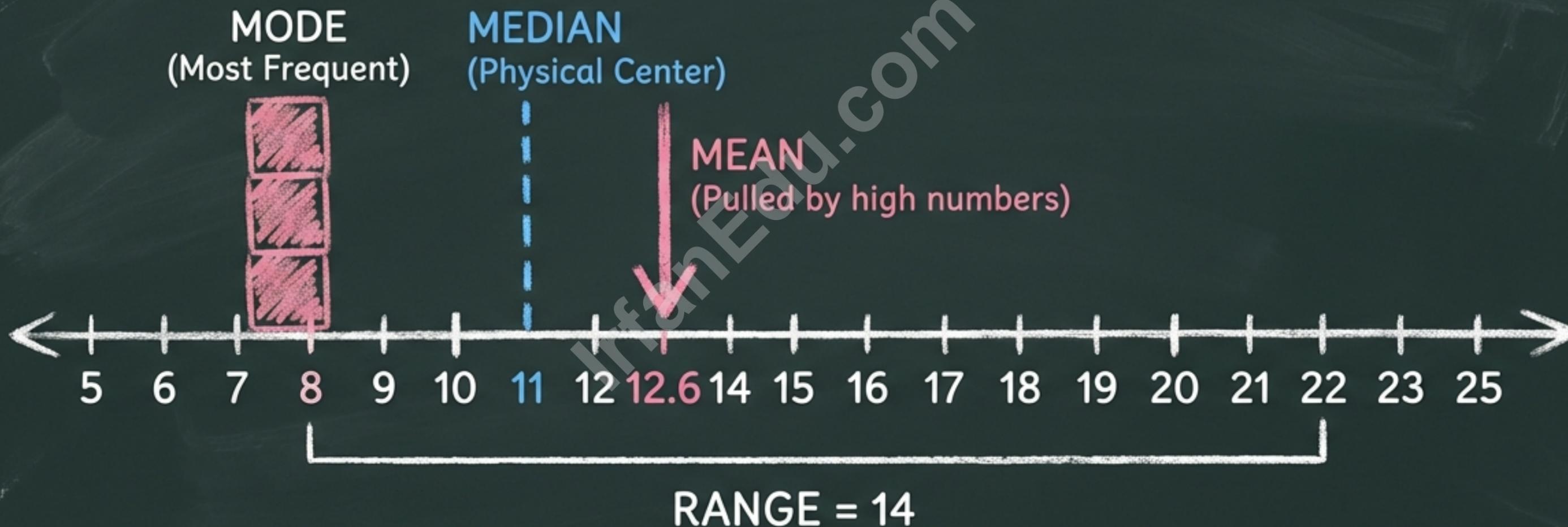
Range = Max Value - Min Value

MODE RULE

No calculation needed. Just count frequency.
(Can have 0, 1, or multiple modes).

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Visualizing the Data

Patrick Hand

Data Set: {8, 8, 8, 10, 12, 15, 18, 22}

MODE (Most Frequent)

MEDIAN (Physical Center)

MEAN (Pulled by high numbers)

5 6 7 8 9 10 11 12 12.6 14 15 16 17 18 19 20 21 22 23 25

RANGE = 14

Notice: In this skewed set, Mode < Median < Mean.

Chalk Talk: Finding All Four Measures

Data Set: {12, 8, 15, 8, 22, 10, 8, 18}

Step 1: Order the List: {8, 8, 8, 10, 12, 15, 18, 22}

Step 2: Mode: 8 appears 3 times → Mode = 8

Step 3: Median: 8 items (even). Average the 4th and 5th terms (10 and 12).

$$\frac{10 + 12}{2} = 11$$

Step 4: Mean: Sum (101) ÷ Count (8) = 12.625

Step 5: Range: 22 − 8 = 14

The ACT Trap: The "Reverse Mean" Problem

The mean of 5 scores is 84. Four scores are 78, 82, 88, 90. What is the fifth?

Secret Formula: Total Sum = Mean × Number of Values

1. Find Required Total: $84 \times 5 = 420$
2. Sum of Knowns: $78 + 82 + 88 + 90 = 338$
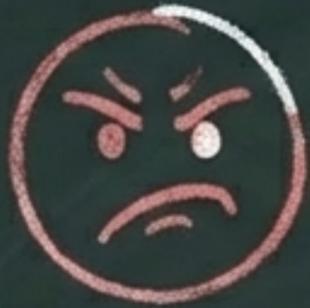3. Subtract: $420 - 338 = 82$

The fifth score is 82.
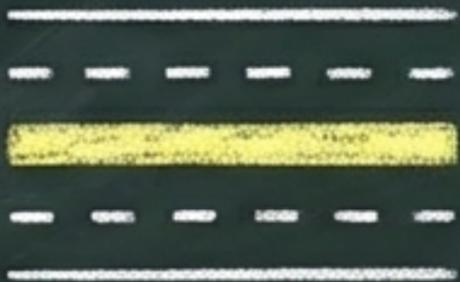
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Quick Comparison: When to Use What

Measure	Best Used For	Affected by Outliers?
Mean	Evenly distributed data	YES (Avoid if skewed)
Median	Data with outliers (e.g. Salaries)	NO (Safe choice)
Mode	Finding frequency patterns	NO
Range	Measuring spread/variability	YES

Pro Tip: If the data has extreme highs or lows, the Median is usually better than the Mean.
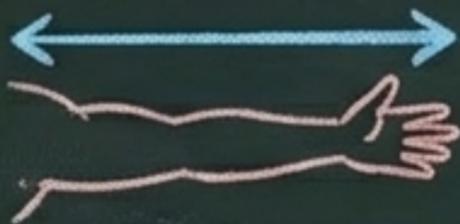
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Memory Hooks (Mnemonics)

Mean is **MEAN**. It forces every number to participate, even the outliers.

Median is the **MIDDLE-an**. Like the strip in the middle of the road.

Mode is the **MOST**. Both start with **MO**.

Range is the **REACH**. How far from low to high?

Red Flags: 5 Common Mistakes

⚠️ 1. Forgetting to Order: Finding the median of a jumbled list is the #1 error.

⚠️ 2. Confusing Definitions: Don't calculate Mean when asked for Median.

⚠️ 3. The Even Split: For even counts, you MUST average the two middle numbers.

⚠️ 4. Forcing a Mode: If all numbers appear once, there is NO mode.

⚠️ 5. Calculator Errors: Hit "Equals" after adding the sum before you hit divide!
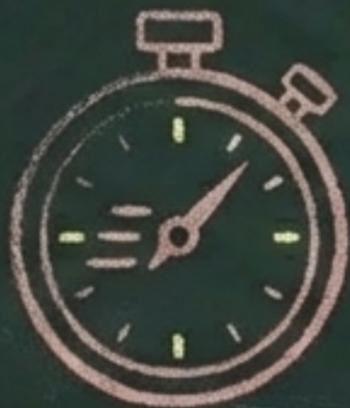
Speed Strategy & ACT Shortcuts

Continuous Addition: Don't clear the screen. Type 12+15+8= then divide. Reduces typos.

Median Position Trick: For odd lists, use $(n+1) / 2$ to find the rank. (e.g., 7 items? Median is the 4th item).

1	2	3	4	5	6	7

Target Time: 60–90 seconds per question. Eliminate choices outside the min/max range immediately.

Pop Quiz: Basic & Intermediate

Q: Find the median of {15, 22, 18, 30, 25, 18, 20}.

Solution: Order first -> {15, 18, 18, 20, 22, 25, 30}. The 4th value is (20)

Q: Mean of 6 numbers is 45. One number is 60. What is the mean of the remaining 5?

Solution: Total = 45×6 = 270. Remaining Sum = 270 – 60 = 210. New Mean = 210 / 5 = (42)

Pop Quiz: Advanced Trap

Patrick Hand: A data set has 8 values with a ~~mean of 50~~ and a range of 24. If the smallest value is 38, what is the largest value?

Distractor! Ignore this.

Solution: Range = Max − Min

$$24 = Max - 38$$

$$Max = 24 + 38$$

$$Answer = 62$$

Stuck? Strategic Guessing Checks

Sanity Check: Is the answer reasonable? A mean cannot be higher than your biggest number.

Quick Count: Did you verify 'n'? Recount the items to ensure you divide by the right number.

Guessing: Eliminate outliers. On ACT Math, answers near the middle of the range are statistically safer bets.

Class Dismissed: Your Path to Mastery

You have the tools. Practice 15-20 problems to lock in the logic. These 5-8 points are yours to take.

Good Luck! 🚀

Written by Irfan Mansuri
ACT Test Prep Specialist & Educator (15+ Years Experience)
Founder of IrfanEdu.com