# Comparing Populations with Measures of Center and Variability

Spot mistakes, reason, and work backward

**Name** _____ **Date** _____ **Score** _____ / 6

**QUICK REVIEW**

Mean is sum divided by count; MAD is the mean distance from the mean. Order values before finding the median. For $1, 1, 10$, the median is $1$ and the range is $10 - 1 = 9$. Use the same units when comparing centers or spreads.

**Worked example**

A student finds the median of $3, 6, 8, 13$ by averaging the endpoints. Repair the method and find the median.

**1.** Averaging the endpoints gives $(3 + 13)/2 = 8$, not necessarily the median.

**2.** There are $4$ ordered values. The middle positions are $2$ and $3$, with values $6$ and $8$.

**3.** The median is $(6 + 8)/2 = 7$.

**Answer:** Median $7$, not $8$.

## Practice Problems

Show your thinking.

**1.** Group A recorded $10, 14$ minutes; group B recorded $16, 16, 18, 18$. A report averages the two group means to get the mean of all six waits. Find the true pooled mean and explain.

**2.** The recorded lengths are $10, 12, 12, 14, 12$ cm. A student ignores the zero distances when counting how many to divide by for MAD. Correct the MAD and explain.

**3.** Four fill readings $8, 10, 12, \square$ mL have mean $11$ mL. Recover the missing reading, then find the range and MAD of the completed data.

**4.** A report uses the average of the endpoints as each median. A: $16, 9, 14, 10, 11$. B: $8, 20, 12, 15, 10, 13$. Find the actual medians and ranges.

**5.** The four times $6, 7, 7, 8$ minutes get a fifth value of $24$ minutes. A report keeps using four as the divisor for the mean. Find both centers before and after and state which moves less.

**6.** A: $7, 9, 11, 13$ points. B: $9, 9, 11, 11$ points. A report says their MADs are both zero because signed deviations cancel. Correct the claim and choose the more consistent set.

# Answer Key

1. $\frac{46}{3}$ min. Group B has twice as many waits as A.
2. MAD $0.8$ cm; all five distances count.
3. Missing $14$ mL; range $6$ mL; MAD $2$ mL.
4. A: median $11$, range $7$. B: median $12.5$, range $12$.
5. Mean: $7$ to $10.4$ min. Median: $7$ min both times, so it moves less.
6. A MAD $2$ points; B MAD $1$ point. B is more consistent.

## Step-by-Step Solutions

Follow each calculation, then check your own work.

### Problem 1

**1.** A contributes $10 + 14 = 24$ min from $2$ waits. B contributes $16 + 16 + 18 + 18 = 68$ min from $4$ waits.

**2.** Pool all observations: $(24 + 68)/(2 + 4) = 92/6 = \frac{46}{3}$ min.

**3.** Averaging the group means would give $(12 + 17)/2 = 14.5$ min and weight the two groups equally despite their different counts.

### Problem 2

**1.** Mean: $(10 + 12 + 12 + 14 + 12)/5 = 60/5 = 12$ cm.

**2.** The distances are $2, 0, 0, 2, 0$ cm, with sum $2 + 0 + 0 + 2 + 0 = 4$ cm.

**3.** The correct MAD is $4/5 = 0.8$ cm, not $4/2 = 2$ cm. A zero distance is still an observation.

### Problem 3

**1.** All four must sum to $4 \times 11 = 44$ mL. The three shown total $8 + 10 + 12 = 30$ mL.

**2.** The missing reading is $44 - 30 = 14$ mL. The range is $14 - 8 = 6$ mL.

**3.** The distances from $11$ are $3, 1, 1, 3$ mL, so MAD $= (3 + 1 + 1 + 3)/4 = 2$ mL.

### Problem 4

**1.** A in order: $9, 10, 11, 14, 16$. Its third value is $11$. Range: $16 - 9 = 7$.

**2.** B in order: $8, 10, 12, 13, 15, 20$. Average the middle pair: $(12 + 13)/2 = 12.5$. Range: $20 - 8 = 12$.

**3.** Endpoint averages are $(9 + 16)/2 = 12.5$ for A and $(8 + 20)/2 = 14$ for B. Neither gives the actual median.

### Problem 5

**1.** Original total: $6 + 7 + 7 + 8 = 28$ min. Original mean: $28/4 = 7$ min.

**2.** New total: $28 + 24 = 52$ min. Divide by five: $52/5 = 10.4$ min, not $52/4 = 13$ min.

**3.** The old middle pair gives $(7 + 7)/2 = 7$ min. The new third value is still $7$ min.

**4.** The mean rises $10.4 - 7 = 3.4$ min. The median stays put.

### Problem 6

**1.** Both means are $40/4 = 10$ points. For A, signed deviations add to $-3 - 1 + 1 + 3 = 0$.

**2.** Use absolute distances instead: A MAD $= (3 + 1 + 1 + 3)/4 = 2$ points.

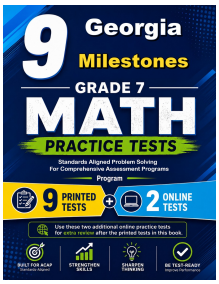
**3.** B MAD $= (1 + 1 + 1 + 1)/4 = 1$ point, so B has the smaller MAD.

TESTINAR

# Keep Building Grade 7 Math Skills

Choose the practice book matched to your state assessment and turn worksheet practice into a complete test-prep plan.

All Grade 7 books



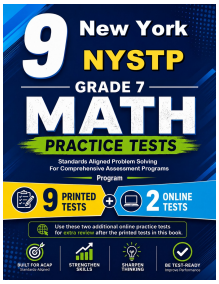

GEORGIA MILESTONES

## 9 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 9 printable practice tests.

**Printable eBook • Instant PDF access**

View eBook



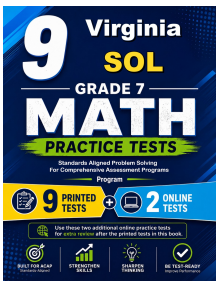

NEW YORK NYSTP

## 9 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 9 printable practice tests.

**Printable eBook • Instant PDF access**

View eBook




VIRGINIA SOL

## 9 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 9 printable practice tests.

**Printable eBook • Instant PDF access**

View eBook

**Need a different state?**
Testinar has Grade 7 math practice books for state assessments across the country.

TESTINAR.COM/GRADES/7