

Statistics and Probability

Center needs a spread story



Grade 6 • NC.6.SP.3

Teacher guide, models and student practice

Seven instructional sections • 30 multiple-choice items • 30 open/performance tasks •
Worked keys and evidence records

A reusable, multi-session resource bank. Select a few items for a lesson; do not assign all 60 in one sitting. All classroom-object data are synthetic unless learners collect their own safe object measurements.

Aligned to current NC standards for 2026-27 and 2027-28. The newly adopted 2026 standards begin in 2028-29 and are not substituted here.

Free sample | Contents

NC.6.SP.3 | Sixth Grade mathematics

This sample contains 12 complete selected pages from the 80-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-8, 10-11, 62, 69

Representative activities

M01: sample PDF page(s) 9; original page(s) 8

M02: sample PDF page(s) 9; original page(s) 8

O01: sample PDF page(s) 10; original page(s) 10

O02: sample PDF page(s) 11; original page(s) 11

Selected teacher prompts and keys: original page(s) 62, 69

Using this sample

Read the preparation and access guidance before using a selected activity.

Keep teacher keys and private preparation pages separate from student copies.

Use the original resource contents to see the scope of the complete packet.

Complete paid download

The complete resource includes the full PDF task bank and teaching materials.

TEACHER GUIDE

Standard and learning targets

NC.6.SP.3 Understand that both a measure of center and a description of variability should be considered when describing a numerical data set.

a. Determine the measure of center of a data set and understand that it is a single number that summarizes all the values of that data set.

Understand that a mean is a measure of center that represents a balance point or fair share of a data set and can be influenced by the presence of extreme values within the data set.

Understand the median as a measure of center that is the numerical middle of an ordered data set.

b. Understand that describing the variability of a data set is needed to distinguish between data sets in the same scale, by comparing graphical representations of different data sets in the same scale that have similar measures of center, but different spreads.

A • I can interpret and compute mean as fair share or balance point.

B • I can find the median of ordered data and interpret it as center.

C • I can explain the effect of an extreme value on a mean.

D • I can compare same-scale plots with similar centers and different spreads.

Essential question: How can our questions, displays and summaries preserve what varies in a collection of observations?

Evidence: individual explanations, accurate records or displays, and supported interpretations. Multiple-choice recognition alone cannot establish collection, construction or reasoning performance.

TEACHER GUIDE

Readiness, materials and access

Prerequisites: count repeated observations; order nonnegative whole numbers and simple decimals; add and divide; read equal-interval number lines. For box plots, establish median before finding medians of halves. Teach these prerequisites when needed; do not turn this packet into a speed test.

Materials: pencil, blank paper, ruler, optional calculator to check arithmetic, and safe classroom paper/cardboard objects. For physical collection, use object IDs rather than names. Adults handle any cutting. No child measurements, health information, identity data or other personal records are needed.

Access: neutral read-aloud, large print, tactile number lines/value cards, AAC, signed, oral, dictated or drawn explanations are valid when they preserve the target. A scribe records the learner's own reasoning. Do not name the correct statistic, sort the data for a median check, or point out a graph answer during independent evidence collection.

Support log: distinguish access tools from answer-supplying prompts. Record a modeled or jointly completed item as instruction, then seek a fresh individual response. If a representation is inaccessible or the learner is unobserved, use N/O rather than an incorrect score.

Vocabulary: observation, attribute, unit, variability, distribution, frequency, center, mean, median, range, cluster, gap, tail, dot plot, histogram, quartile and box plot. Introduce only the words needed for the current target. Home-language explanations are welcome.

Differentiation: use a smaller new data set for reteaching, retain repetitions, and restore full task scope for a later check. Extend by asking how a changed observation changes a display or summary; do not infer unsupported facts about objects outside the collection.

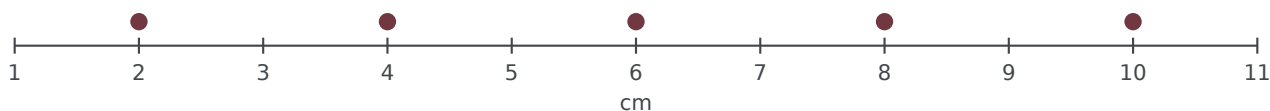
TEACHER MODEL • NOT A STUDENT ASSESSMENT

Fair share, middle and variability

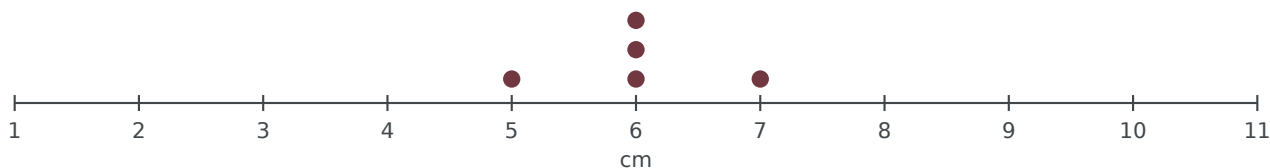
Say: "For 2, 4, 6, 8, 10, the total is 30. Five equal shares of 6 keep the total 30, so the mean is 6. The third ordered value is 6, so the median is 6. Distances from 6 are -4, -2, 0, 2, 4; their sum is zero, so 6 is a balance point. Compare 5, 6, 6, 6, 7 on the same scale: mean and median are still 6, but range is 2 instead of 8. Now replace 10 by 20 in the first set. The total is 40 and mean is 8; median stays 6. A high extreme value pulls the mean upward. Center and spread belong together."

Worked same-scale comparison

A



B



Pause and ask: What does one observation mean? Where can you see evidence for this claim? Invite an alternative explanation, then verify it against every observation.

REUSABLE ANCHOR

Keep the data story intact

Mean = sum of all observations $\div$ number of observations. Equal redistribution preserves the total.

Balance point: distances below and above the mean balance; signed deviations sum to zero.

Median: order first, then use the middle value or average of the two middle values.

Describe spread along with center. Compare plots on the same scale. Extreme values can pull the mean toward them.

Blank reasoning organizer

Question / objects / attribute / method / units

Evidence from the data or display

Claim, justification and one limitation

TEACHER GUIDE

Select a core across sessions

Suggested pacing: Session 1 (35 minutes): warm-up, model, guided work. Session 2 (30 minutes): collaborative and independent practice. Session 3 or conferences (15+ minutes): reteach, exit and unfinished performance evidence. Collection and two-display tasks may need an additional 15-25 minutes. Timing is instructional guidance, never a scoring cutoff.

Warm-up: M01-M04 and O01-O04. Begin with M01 and O01; use remaining items for later practice or conferences.

I Do: M05-M08 and O05-O08. Begin with M05 and O05; use remaining items for later practice or conferences.

We Do: M09-M13 and O09-O13. Begin with M09 and O09; use remaining items for later practice or conferences.

Collaborative practice: M14-M18 and O14-O18. Begin with M14 and O14; use remaining items for later practice or conferences.

Independent practice: M19-M23 and O19-O23. Begin with M19 and O19; use remaining items for later practice or conferences.

Small-group reteach: M24-M27 and O24-O27. Begin with M24 and O24; use remaining items for later practice or conferences.

Exit ticket: M28-M30 and O28-O30. Begin with M28 and O28; use remaining items for later practice or conferences.

Observe these dimensions separately

Question/plan or representation • computation and accuracy • contextual reasoning. Score each dimension: 3 = accurate and justified independently; 2 = mostly sound with a limited error or incomplete justification; 1 = partial relevant evidence with substantial gaps; 0 = observed, interpretable incorrect performance; N/O = not observed, inaccessible or insufficient evidence. These are instructional descriptions, not official mastery cutoffs.

Do not score handwriting, accent or spelling unless meaning is lost. Never combine an N/O with zero. Record which task and support produced the evidence.

TEACHER MOVES • WARM-UP

Warm-up: choose, observe, respond

Selected core: M01 and O01; bank M01-M04, O01-O04. Suggested 8 minutes.

Focus: Interpret and compute mean as fair share or balance point.

0-2: Ask learners to read the question and name what counts as one observation. 2-5: Use the selected M item as a low-stakes probe. 5-8: Ask for a brief individual start on the selected O item; collect the reasoning, not just the answer.

Say: "What would we need to observe? Which values or features matter to this question?"

Listen/look for: Total $40 \div 5 = 8$. Signed distances from 8 are -3, -1, 0, 1, 3; sum 0. Four units of distance below balance four above. Mark each count on the line; the mean is the balance point.

If evidence is missing: If median is found before sorting, reorder physical value cards. If mean is computed by averaging endpoints, redistribute the complete total. Use same-scale plots when a shared center is mistaken for equal spread.

Neutral prompt: "Show where that comes from in your record." Access: read words without pointing to a correct value. Extension: alter one observation or one question condition and defend what changes. Record the learner's actual response, support and next step.

WARM-UP • STUDENT CHOICE PRACTICE

Read, choose, then justify

M01 • Target A

Synthetic elapsed time data for mock delivery trials (seconds): 13, 14, 15, 16, 17, 18, 19. The total is 112. What does the mean represent?

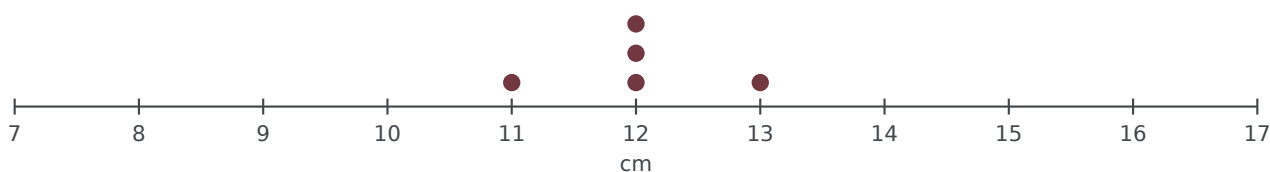
- A. The smallest share, 13 seconds, in every observation.
- B. The count of 7 seconds in the entire collection.
- C. The total of 112 seconds for each observation.
- D. A fair share of 16 seconds per observation.

Evidence / quick check: _____

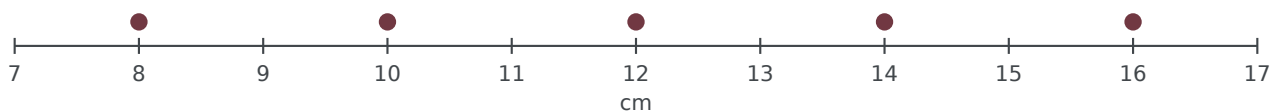
M02 • Target D

Which comparison of these same-scale strip-length plots is correct?

A



B



- A. Both centers are 12 cm; A is more spread out.
- B. Both centers are 12 cm; B is more spread out.
- C. B has a smaller median; both ranges are equal.
- D. A has a larger mean; both ranges are equal.

Evidence / quick check: _____

WARM-UP • STUDENT PERFORMANCE

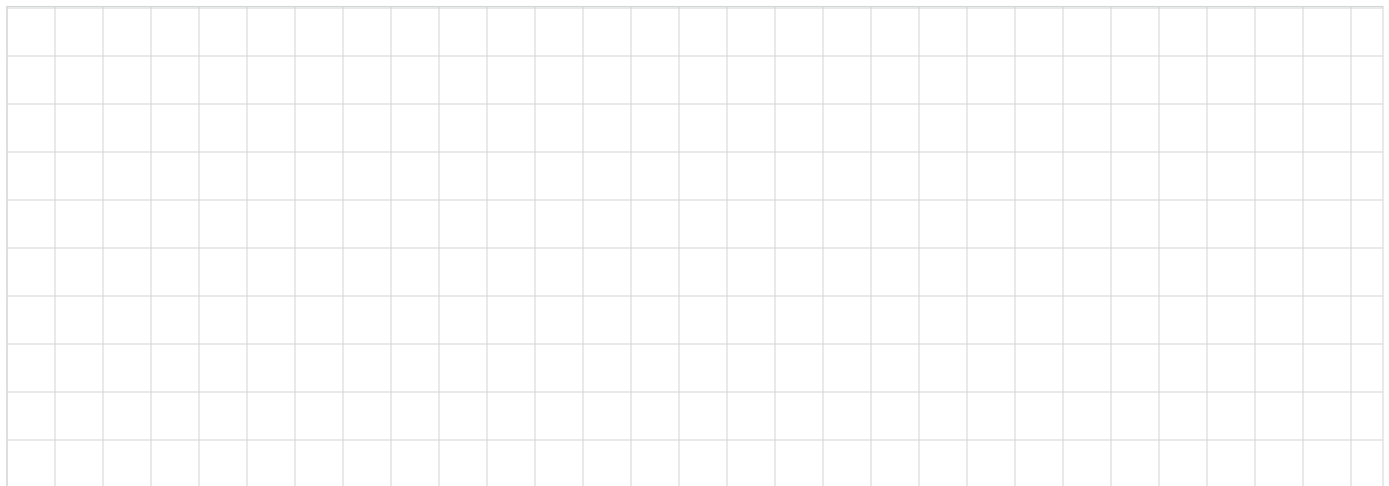
001 • Make your thinking visible

Target A • Interpret and compute mean as fair share or balance point.

Synthetic object counts are 5, 7, 8, 9, 11. Find the mean. Draw a number line and show each distance below or above your proposed balance point. Explain why the distances balance.

Data record / plan / calculations (use object IDs and units)

Plotting / model workspace: label your own axes, scale and units



Explanation / answer in context

WARM-UP • STUDENT PERFORMANCE

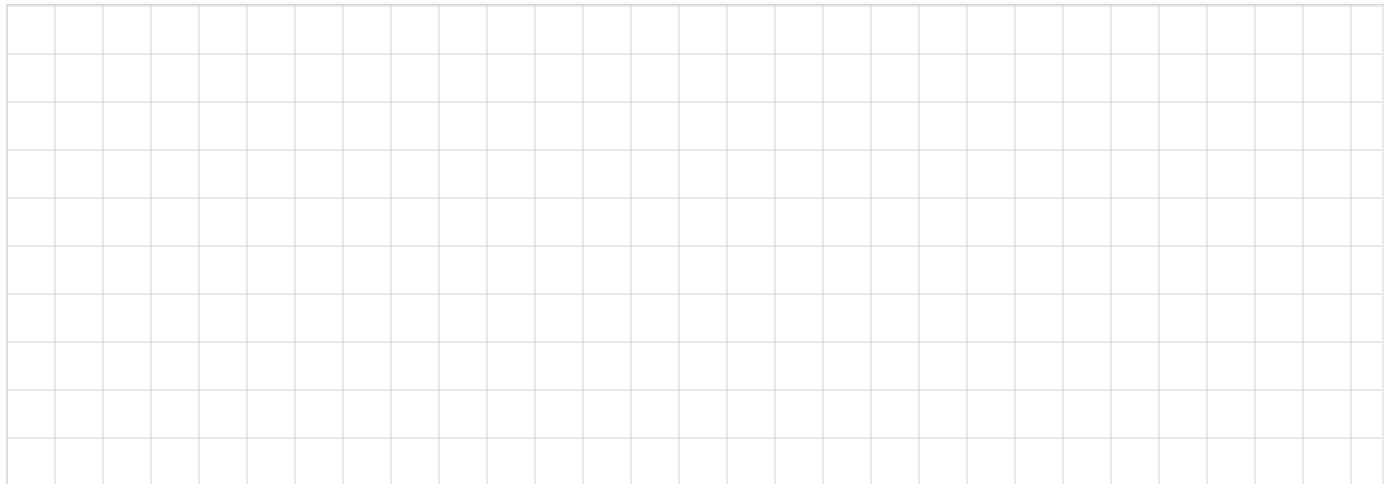
002 • Make your thinking visible

Target C • Explain the effect of an extreme value on a mean.

Synthetic elapsed time data for mock delivery trials (seconds): 8, 11, 12, 13, 13, 14, 14, 14, 15. Replace one value of 15 with 27. Find the old and new mean and median. Explain why they change or stay fixed, and what this shows about extreme values.

Data record / plan / calculations (use object IDs and units)

Plotting / model workspace: label your own axes, scale and units



Explanation / answer in context

TEACHER-ONLY WORKED KEY

Check reasoning, not just answers

M01 • Answer D: A fair share of 16 seconds per observation.

Equal redistribution gives $112 \div 7 = 16$ seconds per observation. A mean need not be one of the original values.

M02 • Answer B: Both centers are 12 cm; B is more spread out.

Both means and medians equal 12. Range A = 2 cm; range B = 8 cm. A center alone cannot distinguish their variability.

M03 • Answer B: 15

$n = 9$; total = 135; mean = $135 \div 9 = 15$; median = 15; range = $17 - 13 = 4$. Fair share redistributes the total equally among all observations.

M04 • Answer A: 6

$n = 9$; total = 63; mean = $63 \div 9 = 7$; median = 6; range = $14 - 4 = 10$. Sort first; for even n average the two central entries, not the endpoints.

TEACHER-ONLY WORKED KEY

Check reasoning, not just answers

M29 • Answer A: 7

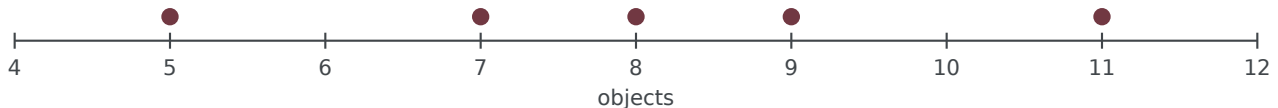
$n = 9$; total = 63; mean = $63 \div 9 = 7$; median = 7; range = $9 - 5 = 4$. Fair share redistributes the total equally among all observations.

M30 • Answer D: Both centers are 9 cm; A is more spread out.

Both means and medians equal 9. Range A = 8 cm; range B = 2 cm. A center alone cannot distinguish their variability.

O01 • Sample response / required evidence

Total $40 \div 5 = 8$. Signed distances from 8 are -3, -1, 0, 1, 3; sum 0. Four units of distance below balance four above. Mark each count on the line; the mean is the balance point.



O02 • Sample response / required evidence

Original: $n = 9$; total = 114; mean = $114 \div 9 \approx 12.667$; median = 13; range = $15 - 8 = 7$. Revised: $n = 9$; total = 126; mean = $126 \div 9 = 14$; median = 13; range = $27 - 8 = 19$. Mean changes by $(12)/9 \approx 1.333$; the middle ordered positions stay fixed, so median remains 13. This extreme replacement affects the mean more.