

TEACHER AND STUDENT PACKET

Comparing Data Distributions

NC Math 1 • NC.M1.S-ID.2



Seven instructional sections • 30 multiple-choice items • 30 open and performance tasks

Detailed teacher scripts, supplied datasets, original data displays, student workspaces, worked keys, rubrics, and observation records.

Reusable across multiple lessons. Choose a focused subset for each session; the 60-item bank is not a one-sitting assessment.

Free sample | Contents

NC.M1.S-ID.2 | NC Math 1 mathematics

This sample contains 22 complete selected pages from the 138-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-16, 45-46, 76-77, 106-107

Representative activities

M01: sample PDF page(s) 16; original page(s) 15

M02: sample PDF page(s) 17; original page(s) 16

O01: sample PDF page(s) 18; original page(s) 45

O02: sample PDF page(s) 19; original page(s) 46

Selected teacher prompts and keys: original page(s) 76-77, 106-107

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.

ALIGNMENT

Standard, scope, and targets

Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. Interpret differences in shape, center, and spread in the context of the data sets.

- Describe and compare distribution shapes using aligned plots.
- Compute and interpret mean and population standard deviation.
- Compute and interpret median and interquartile range.
- Choose summaries appropriate to shape and compare in context.

Every task has its own printed neutral target. All nested scope is included; this standard has no lettered subobjectives. Course placement is NC Math 1, not a fixed grade.

Bank navigation

Warm-up: M01-M04 and O01-O04 (4 in each bank).

I Do: M05-M08 and O05-O08 (4 in each bank).

We Do: M09-M13 and O09-O13 (5 in each bank).

Collaborative practice: M14-M18 and O14-O18 (5 in each bank).

Independent practice: M19-M23 and O19-O23 (5 in each bank).

Small-group reteach: M24-M27 and O24-O27 (4 in each bank).

Exit ticket: M28-M30 and O28-O30 (3 in each bank).

PLANNING AND ACCESS

Plan for meaningful evidence

Suggested sequence: Session 1, conventions and first model; Session 2, supported construction/comparison; Session 3, independent transfer; Session 4, targeted reteach and an exit performance. Use 35-55 minute lessons flexibly. Save unused bank items for later checks.

Prerequisites: order real numbers, count repeated observations, compute a mean and median, interpret equal-interval scales, and distinguish a count from the measured units. Check these in an unscored mini-task before the selected standard task.

Materials: printed workspaces, pencil, ruler, and school-approved calculator/statistics software. For S-ID.1 every learner needs access to a tool that can produce histograms and ordinary box plots with configurable bins/quartiles or custom plotting from calculated summaries. Secure tool approval and access before assessment; no particular brand, account, or internet access is assumed.

Access: enlarge print, read directions verbatim, provide tactile or high-contrast scales, permit dictation, or use an accessible school-approved plotting tool. Keep data and task demand unchanged. Do not provide completed plots, selected summaries, or answer values as neutral supports. Log any answer-supplying cues separately.

If technology is unavailable, teach the hand construction as preparation. Record N/O for the S-ID.1 technology performance and arrange a later accessible tool session; do not treat a paper substitute as completed technology evidence.

Teacher preparation: run the chosen tool on the worked model, inspect bin endpoints and quartile defaults, and ensure learner exports can be printed or attached. These packet examples are generated illustrations; they do not document any learner's runtime activity.

REFERENCE

Conventions and anchor chart

Quartiles: sort the data, take the median, then take the median of each half; exclude the overall median when n is odd. Ordinary box plots use minimum and maximum whiskers even when a value is flagged. A modified box plot would use fences and separate outlier marks; do not mix the conventions. Outlier flags use values strictly below $Q1 - 1.5 \times IQR$ or above $Q3 + 1.5 \times IQR$. All batches are complete fictional populations, so $SD = \sqrt{(\sum(x - \text{mean})^2/n)}$, not sample s with $n - 1$. Report decimal statistics to two places when needed, rounding halfway away from zero; keep intermediate calculations unrounded. All tasks are educational synthetic data, not measurements of children or other identifiable people.

How to choose summaries

For roughly symmetric distributions without dominating extremes, mean and SD use all observations. For skewed distributions or strong extreme observations, median and IQR often better describe a typical value and the middle half. Always describe the shape first; the mean remains mathematically valid but may poorly describe a typical case.

Histogram: use equal-width bins, state endpoint inclusion, label the measured units horizontally and frequency vertically. Adjacent bins touch. Box plot: locate the five-number summary on one uniform real-number scale. Dot plot: use one dot per observation and stack repeats. Compare groups only on the same horizontal scale.

Outlier reasoning: an outlier rule flags observations for attention. It is not proof of an error. Explain whether the value is valid for the intended population before deciding to correct, remove, or retain it.

TEACHER DEMONSTRATION

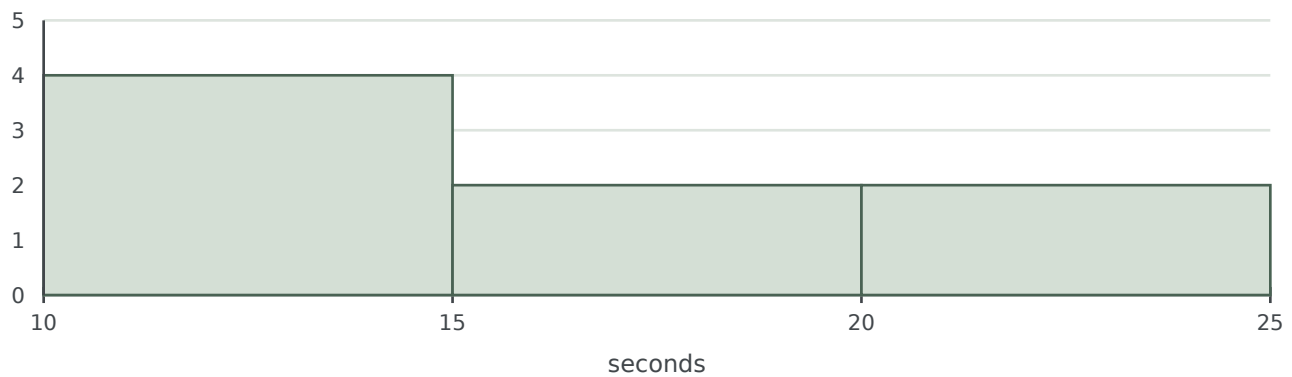
Worked model: build and check

Fictional machine cycle times (seconds): 10, 12, 12, 14, 16, 18, 20, 22. Sort and check $n = 8$. Lower half 10,12,12,14 has median 12. Upper half 16,18,20,22 has median 19. Overall median $= (12 + 19)/2 = 15.5$. Mean $= 124/8 = 15.5$. IQR $= 19 - 12 = 7$ seconds.

In the approved tool: clear a new data list; enter all eight values (keep both 12s). Select frequency histogram; set start 10, width 5, end 25 and bins $[10,15)$, $[15,20)$, $[20,25)$. Verify counts 4,2,2. Select ordinary box plot. Check min 10, Q1 12, median 15.5, Q3 19, max 22; configure quartiles or plot these coordinates in the tool. Record the settings and save both outputs.

Frequency histogram

Frequency



Ordinary box plot



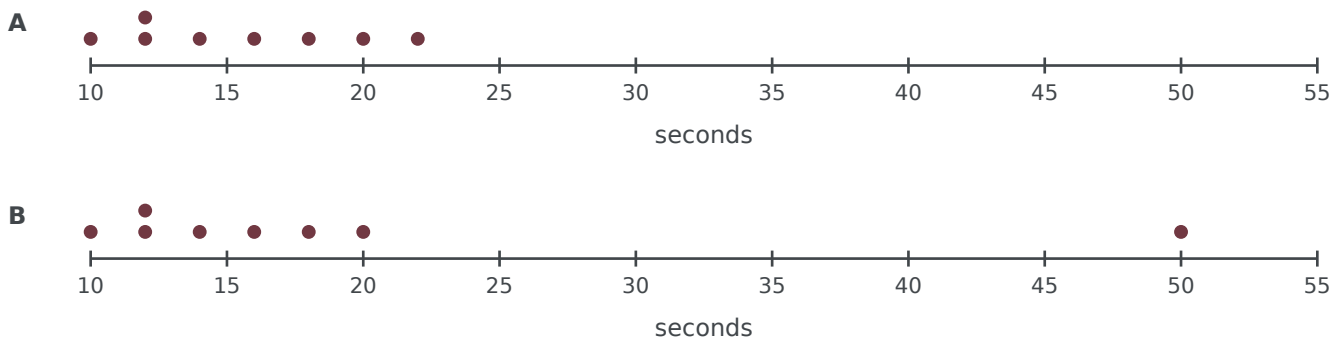
TEACHER DEMONSTRATION

Worked model: compare and explain

Change the last observation from 22 to 50 seconds. Original: Sorted data: 10, 12, 12, 14, 16, 18, 20, 22. $n = 8$, $\text{sum} = 124$; $\text{mean} = 124/8 = 15.5$. Five-number summary (min, Q1, median, Q3, max): (10, 12, 15, 19, 22). $\text{IQR} = 19 - 12 = 7$. Sum of squared deviations = 126; population $\text{SD} = \sqrt{126/8} = 3.97$. Range = 12. Fence interval: [1.5, 29.5].

Changed: Sorted data: 10, 12, 12, 14, 16, 18, 20, 50. $n = 8$, $\text{sum} = 152$; $\text{mean} = 152/8 = 19$. Five-number summary (min, Q1, median, Q3, max): (10, 12, 15, 19, 50). $\text{IQR} = 19 - 12 = 7$. Sum of squared deviations = 1176; population $\text{SD} = \sqrt{1176/8} = 12.12$. Range = 40. Fence interval: [1.5, 29.5].

The high tail lengthens. Mean rises from 15.5 to 19; median stays 15 and IQR stays 7. SD rises from 3.97 to 12.12 seconds; range rises from 12 to 40 seconds. The new upper fence is 29.5, so 50 is flagged. The graph alone cannot tell whether 50 is an error. Mean/SD are more affected here than median/IQR.

Aligned dot plots

REPRODUCIBLE

Reasoning organizer

Learner: _____ Date: _____ Task: _____

Givens, units, and complete data

Representation / tool and settings

Calculations and checks

Contextual conclusion / limitations

TEACHING SCRIPT

Warm-up

Core performance: O01. Optional bank: M01-M04, O01-O04. Suggested 8-18 minutes for the core discussion; complete tool work over a longer block as needed.

Target: Compare shape, appropriate centers, and spreads.

Launch: ask learners what each value measures and why repeated values count separately. First take an unprompted response to the selected M item.

Teacher language: “What must stay the same for this comparison to be fair? Show me where your statement appears in the data or graph. Which convention did you use?”

Core checkpoint for O01: A has $n = 10$, mean 35.7, median 32, IQR 5, population SD 9.74 seconds. B has mean 30.7, median 35, iqr 4, sd 11.29 seconds. Full worked calculations and graphs appear in the task key.

Watch for: dropped repeats, unequal comparison scales, inclusive bins counted twice, confusing SD with variance, and treating a center as a spread. Ask the learner to trace an actual value through the representation. For a quartile discrepancy, inspect the software convention before marking the arithmetic wrong.

Response to a gap: reconstruct the ordered list and mark its two middle positions; then split the halves. For SD, calculate each deviation, square it, average the squares over n , and take the square root. For S-ID.1, guide navigation without entering the learner’s data or selecting their final answer.

Closure and evidence: preserve the first response, note tool/settings and access supports, then ask for a short contextual conclusion. Record later prompted work separately. Select the next task according to the specific missing representation or interpretation.

TEACHING SCRIPT

I Do

Core performance: O05. Optional bank: M05-M08, O05-O08. Suggested 8-18 minutes for the core discussion; complete tool work over a longer block as needed.

Target: Compare shape, appropriate centers, and spreads.

Model: narrate the calculation or tool setting while projecting a teacher copy. Keep the original data visible; ask learners to verify one step instead of copying silently.

Teacher language: “What must stay the same for this comparison to be fair? Show me where your statement appears in the data or graph. Which convention did you use?”

Core checkpoint for O05: A has $n = 10$, mean 31.5, median 26.5, IQR 4, population SD 10.87 seconds. B has mean 37.3, median 41.5, iqr 4, sd 10.95 seconds. Full worked calculations and graphs appear in the task key.

Watch for: dropped repeats, unequal comparison scales, inclusive bins counted twice, confusing SD with variance, and treating a center as a spread. Ask the learner to trace an actual value through the representation. For a quartile discrepancy, inspect the software convention before marking the arithmetic wrong.

Response to a gap: reconstruct the ordered list and mark its two middle positions; then split the halves. For SD, calculate each deviation, square it, average the squares over n , and take the square root. For S-ID.1, guide navigation without entering the learner’s data or selecting their final answer.

Closure and evidence: preserve the first response, note tool/settings and access supports, then ask for a short contextual conclusion. Record later prompted work separately. Select the next task according to the specific missing representation or interpretation.

TEACHING SCRIPT

We Do

Core performance: O09. Optional bank: M09-M13, O09-O13. Suggested 8-18 minutes for the core discussion; complete tool work over a longer block as needed.

Target: Compare shape, appropriate centers, and spreads.

Elicit: have learners propose the scale and compute one checkpoint. Wait for a reason before confirming the value.

Teacher language: “What must stay the same for this comparison to be fair? Show me where your statement appears in the data or graph. Which convention did you use?”

Core checkpoint for O09: A has $n = 8$, mean 23, median 23, IQR 11, population SD 6.12 grams. B has mean 25, median 25, iqr 10, sd 5.24 grams. Full worked calculations and graphs appear in the task key.

Watch for: dropped repeats, unequal comparison scales, inclusive bins counted twice, confusing SD with variance, and treating a center as a spread. Ask the learner to trace an actual value through the representation. For a quartile discrepancy, inspect the software convention before marking the arithmetic wrong.

Response to a gap: reconstruct the ordered list and mark its two middle positions; then split the halves. For SD, calculate each deviation, square it, average the squares over n , and take the square root. For S-ID.1, guide navigation without entering the learner’s data or selecting their final answer.

Closure and evidence: preserve the first response, note tool/settings and access supports, then ask for a short contextual conclusion. Record later prompted work separately. Select the next task according to the specific missing representation or interpretation.

TEACHING SCRIPT

Collaborative practice

Core performance: O14. Optional bank: M14-M18, O14-O18. Suggested 8-18 minutes for the core discussion; complete tool work over a longer block as needed.

Target: Compare shape, appropriate centers, and spreads.

Partner roles: one learner constructs or computes; the other checks against the original list. Switch roles for a second item and retain each learner's explanation.

Teacher language: "What must stay the same for this comparison to be fair? Show me where your statement appears in the data or graph. Which convention did you use?"

Core checkpoint for O14: A has $n = 10$, mean 37.4, median 32.5, IQR 5, population SD 10.61 mL. B has mean 50.5, median 55.5, iqr 5, sd 11.66 mL. Full worked calculations and graphs appear in the task key.

Watch for: dropped repeats, unequal comparison scales, inclusive bins counted twice, confusing SD with variance, and treating a center as a spread. Ask the learner to trace an actual value through the representation. For a quartile discrepancy, inspect the software convention before marking the arithmetic wrong.

Response to a gap: reconstruct the ordered list and mark its two middle positions; then split the halves. For SD, calculate each deviation, square it, average the squares over n , and take the square root. For S-ID.1, guide navigation without entering the learner's data or selecting their final answer.

Closure and evidence: preserve the first response, note tool/settings and access supports, then ask for a short contextual conclusion. Record later prompted work separately. Select the next task according to the specific missing representation or interpretation.

TEACHING SCRIPT

Independent practice

Core performance: O19. Optional bank: M19-M23, O19-O23. Suggested 8-18 minutes for the core discussion; complete tool work over a longer block as needed.

Target: Compare shape, appropriate centers, and spreads.

Independent evidence: provide only the task and neutral access supports. Collect the first response before discussing corrections.

Teacher language: “What must stay the same for this comparison to be fair? Show me where your statement appears in the data or graph. Which convention did you use?”

Core checkpoint for O19: A has $n = 10$, mean 30.9, median 26.5, IQR 2, population SD 9.31 cm. B has mean 44.8, median 49.5, iqr 4, sd 11.81 cm. Full worked calculations and graphs appear in the task key.

Watch for: dropped repeats, unequal comparison scales, inclusive bins counted twice, confusing SD with variance, and treating a center as a spread. Ask the learner to trace an actual value through the representation. For a quartile discrepancy, inspect the software convention before marking the arithmetic wrong.

Response to a gap: reconstruct the ordered list and mark its two middle positions; then split the halves. For SD, calculate each deviation, square it, average the squares over n , and take the square root. For S-ID.1, guide navigation without entering the learner’s data or selecting their final answer.

Closure and evidence: preserve the first response, note tool/settings and access supports, then ask for a short contextual conclusion. Record later prompted work separately. Select the next task according to the specific missing representation or interpretation.

TEACHING SCRIPT

Small-group reteach

Core performance: O24. Optional bank: M24-M27, O24-O27. Suggested 8-18 minutes for the core discussion; complete tool work over a longer block as needed.

Target: Compare shape, appropriate centers, and spreads.

Diagnose: compare the first response with the original data. Reteach only the missing step, then use a different unused item to check transfer.

Teacher language: “What must stay the same for this comparison to be fair? Show me where your statement appears in the data or graph. Which convention did you use?”

Core checkpoint for O24: A has $n = 8$, mean 19, median 19, IQR 11, population SD 6.22 cm. B has mean 20, median 20, iqr 14, sd 7.18 cm. Full worked calculations and graphs appear in the task key.

Watch for: dropped repeats, unequal comparison scales, inclusive bins counted twice, confusing SD with variance, and treating a center as a spread. Ask the learner to trace an actual value through the representation. For a quartile discrepancy, inspect the software convention before marking the arithmetic wrong.

Response to a gap: reconstruct the ordered list and mark its two middle positions; then split the halves. For SD, calculate each deviation, square it, average the squares over n , and take the square root. For S-ID.1, guide navigation without entering the learner’s data or selecting their final answer.

Closure and evidence: preserve the first response, note tool/settings and access supports, then ask for a short contextual conclusion. Record later prompted work separately. Select the next task according to the specific missing representation or interpretation.

TEACHING SCRIPT

Exit ticket

Core performance: O28. Optional bank: M28-M30, O28-O30. Suggested 8-18 minutes for the core discussion; complete tool work over a longer block as needed.

Target: Compare shape, appropriate centers, and spreads.

Close: use the selected exit task without answer cues. Ask for one graph feature and one numerical statement that agree.

Teacher language: “What must stay the same for this comparison to be fair? Show me where your statement appears in the data or graph. Which convention did you use?”

Core checkpoint for O28: A has $n = 10$, mean 44.9, median 42, IQR 3, population SD 8.67 minutes. B has mean 35.6, median 40.5, iqr 2, sd 11.45 minutes. Full worked calculations and graphs appear in the task key.

Watch for: dropped repeats, unequal comparison scales, inclusive bins counted twice, confusing SD with variance, and treating a center as a spread. Ask the learner to trace an actual value through the representation. For a quartile discrepancy, inspect the software convention before marking the arithmetic wrong.

Response to a gap: reconstruct the ordered list and mark its two middle positions; then split the halves. For SD, calculate each deviation, square it, average the squares over n , and take the square root. For S-ID.1, guide navigation without entering the learner’s data or selecting their final answer.

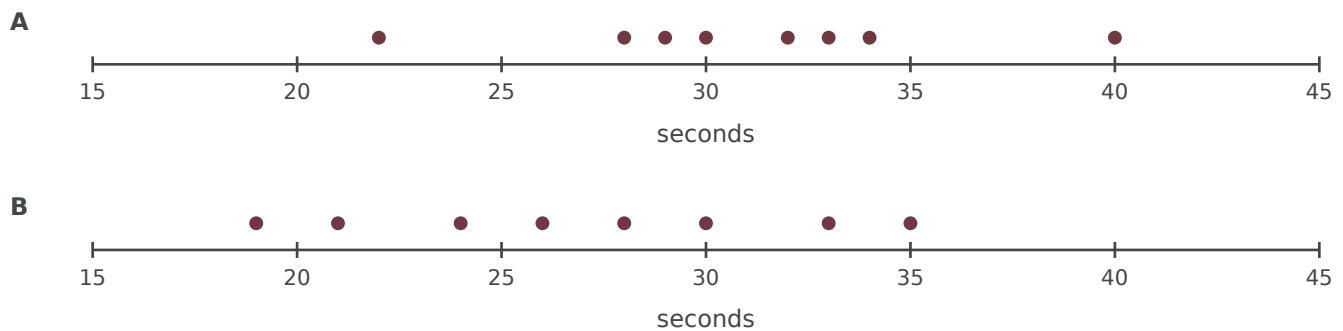
Closure and evidence: preserve the first response, note tool/settings and access supports, then ask for a short contextual conclusion. Record later prompted work separately. Select the next task according to the specific missing representation or interpretation.

MULTIPLE CHOICE

M01**M01 • Warm-up • Compare mean in context.**

Two complete fictional batches of machine cycle times (seconds): A = 22, 28, 29, 30, 32, 33, 34, 40; B = 19, 21, 24, 26, 28, 30, 33, 35. What is B minus A for the mean? Use unrounded intermediate values and round the final difference to two decimals.

Aligned dot plots



- A. -6.00 seconds
- B. -4.00 seconds
- C. -3.00 seconds
- D. -17.00 seconds

Reasoning / data check: _____

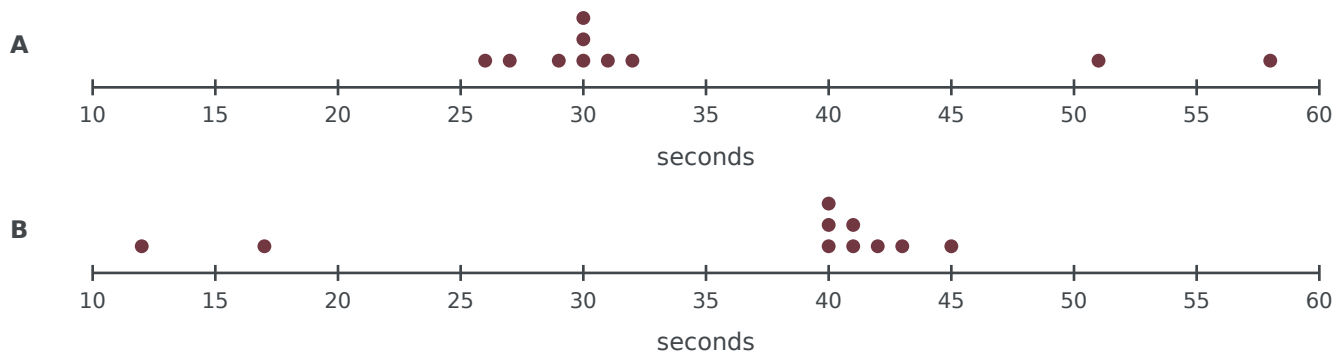
MULTIPLE CHOICE

M02

M02 • Warm-up • Compare median in context.

Two complete fictional batches of machine cycle times (seconds): A = 26, 27, 29, 30, 30, 30, 31, 32, 51, 58; B = 12, 17, 40, 40, 40, 41, 41, 42, 43, 45. What is B minus A for the median? Use unrounded intermediate values and round the final difference to two decimals.

Aligned dot plots



- A. -1.50 seconds
- B. 2.00 seconds
- C. 10.50 seconds
- D. 21.50 seconds

Reasoning / data check: _____

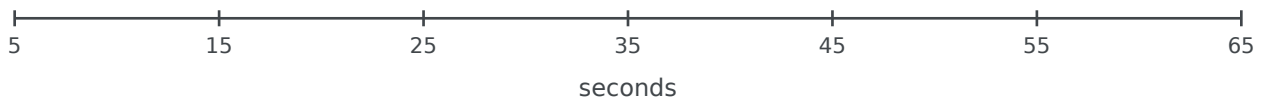
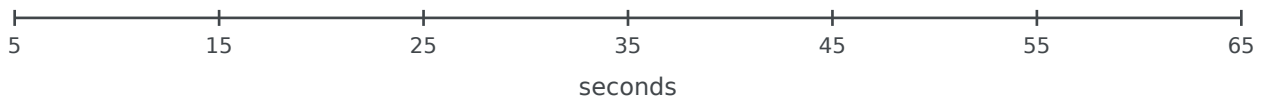
OPEN / PERFORMANCE

001 • Warm-up

Target: Compare shape, appropriate centers, and spreads.

Compare complete fictional batches of machine cycle times (seconds). A: 28, 29, 29, 31, 31, 33, 34, 34, 48, 60. B: 6, 11, 34, 34, 34, 36, 37, 38, 38, 39. Construct aligned dot plots on the same scale. Describe each shape with evidence; choose and justify mean/population SD or median/IQR as the primary comparison. Calculate all four statistics for both batches as a check. Explain which has a higher typical value and which varies more under your chosen measures, including numerical differences and units. Does a higher center necessarily mean greater spread? Explain.

Construct aligned plots: one dot per observation

A**B**

Calculations: use the continuation sheet if needed

Shape, contextual comparison, and explanation

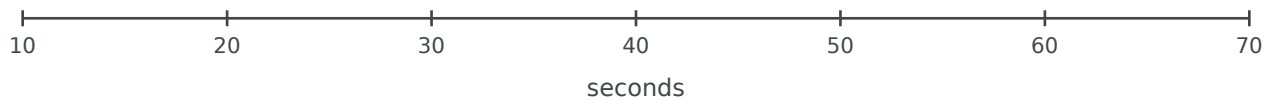
OPEN / PERFORMANCE

002 • Warm-up

Target: Compare shape, appropriate centers, and spreads.

Compare complete fictional batches of machine cycle times (seconds). A: 34, 35, 35, 36, 38, 38, 39, 40, 59, 65. B: 14, 19, 41, 42, 42, 42, 45, 45, 46, 46. Construct aligned dot plots on the same scale. Describe each shape with evidence; choose and justify mean/population SD or median/IQR as the primary comparison. Calculate all four statistics for both batches as a check. Explain which has a higher typical value and which varies more under your chosen measures, including numerical differences and units. Does a higher center necessarily mean greater spread? Explain.

Construct aligned plots: one dot per observation

A**B**

Calculations: use the continuation sheet if needed

Shape, contextual comparison, and explanation

TEACHER KEY

M01 • worked key**M01 target: Compare mean in context.****Answer B: -4.00 seconds**

Sorted data: 22, 28, 29, 30, 32, 33, 34, 40. $n = 8$, $\text{sum} = 248$; $\text{mean} = 248/8 = 31$. Five-number summary (min, Q1, median, Q3, max): (22, 28.5, 31, 33.5, 40). $\text{IQR} = 33.5 - 28.5 = 5$. Sum of squared deviations = 190; population SD = $\sqrt{(190/8)} = 4.87$. Range = 18. Fence interval: [21, 41].

Batch B: Sorted data: 19, 21, 24, 26, 28, 30, 33, 35. $n = 8$, $\text{sum} = 216$; $\text{mean} = 216/8 = 27$. Five-number summary (min, Q1, median, Q3, max): (19, 22.5, 27, 31.5, 35). $\text{IQR} = 31.5 - 22.5 = 9$. Sum of squared deviations = 220; population SD = $\sqrt{(220/8)} = 5.24$. Range = 16. Fence interval: [9, 45]. Difference $B - A = 27 - 31 \approx -4$ seconds (final calculation uses unrounded values). A: -6 differs from the recomputed -4; check the stated statistic, operation, and rounding rather than infer a misconception from this choice alone. B: agrees with the calculation. C: -3 differs from the recomputed -4; check the stated statistic, operation, and rounding rather than infer a misconception from this choice alone. D: -17 differs from the recomputed -4; check the stated statistic, operation, and rounding rather than infer a misconception from this choice alone.

Evidence: a selected letter alone is recognition evidence. Ask for the calculation or graph feature supporting the choice before attributing a specific misconception. Use the matching performance task to examine construction and explanation.

TEACHER KEY

M02 • worked key

M02 target: Compare median in context.**Answer C: 10.50 seconds**

Sorted data: 26, 27, 29, 30, 30, 30, 31, 32, 51, 58. $n = 10$, $\text{sum} = 344$; $\text{mean} = 344/10 = 34.4$. Five-number summary (min, Q1, median, Q3, max): (26, 29, 30, 32, 58). $\text{IQR} = 32 - 29 = 3$. Sum of squared deviations = 1062.4; population SD = $\sqrt{(1062.4/10)} = 10.31$. Range = 32. Fence interval: [24.5, 36.5]. Batch B: Sorted data: 12, 17, 40, 40, 40, 41, 41, 42, 43, 45. $n = 10$, $\text{sum} = 361$; $\text{mean} = 361/10 = 36.1$. Five-number summary (min, Q1, median, Q3, max): (12, 40, 40.5, 42, 45). $\text{IQR} = 42 - 40 = 2$. Sum of squared deviations = 1200.9; population SD = $\sqrt{(1200.9/10)} = 10.96$. Range = 33. Fence interval: [37, 45]. Difference $B - A = 40.5 - 30 \approx 10.5$ seconds (final calculation uses unrounded values). A: -1.5 differs from the recomputed 10.5; check the stated statistic, operation, and rounding rather than infer a misconception from this choice alone. B: 2 differs from the recomputed 10.5; check the stated statistic, operation, and rounding rather than infer a misconception from this choice alone. C: agrees with the calculation. D: 21.5 differs from the recomputed 10.5; check the stated statistic, operation, and rounding rather than infer a misconception from this choice alone.

Evidence: a selected letter alone is recognition evidence. Ask for the calculation or graph feature supporting the choice before attributing a specific misconception. Use the matching performance task to examine construction and explanation.

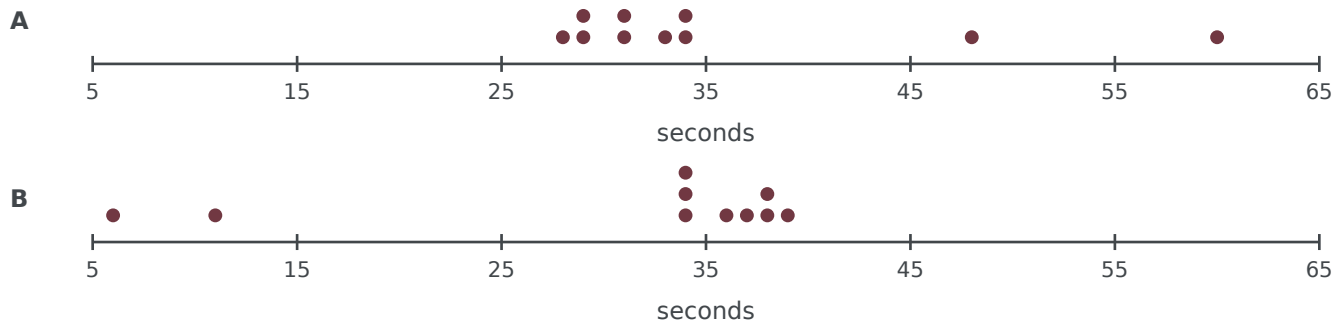
TEACHER KEY

001 • worked key

Target: Compare shape, appropriate centers, and spreads.

Batch A: Sorted data: 28, 29, 29, 31, 31, 33, 34, 34, 48, 60. $n = 10$, $\text{sum} = 357$; $\text{mean} = 357/10 = 35.7$. Five-number summary (min, Q1, median, Q3, max): (28, 29, 32, 34, 60). $\text{IQR} = 34 - 29 = 5$. Sum of squared deviations = 948.1; population $\text{SD} = \sqrt{(948.1/10)} = 9.74$. Range = 32. Fence interval: [21.5, 41.5]. Batch B: Sorted data: 6, 11, 34, 34, 34, 36, 37, 38, 38, 39. $n = 10$, $\text{sum} = 307$; $\text{mean} = 307/10 = 30.7$. Five-number summary (min, Q1, median, Q3, max): (6, 34, 35, 38, 39). $\text{IQR} = 38 - 34 = 4$. Sum of squared deviations = 1274.1; population $\text{SD} = \sqrt{(1274.1/10)} = 11.29$. Range = 33. Fence interval: [28, 44]. Shape A: right-skewed; B: left-skewed. A has a high-value tail and B a low-value tail. Median and IQR resist the extreme observations and are preferable for typical-value comparisons. Using median, higher center: B; $B - A = 3$ seconds. Using IQR, greater spread: A; $B - A = -1$ seconds. Center describes location while spread describes dispersion; shifting every value changes center without changing spread. Dot plots below show every observation, with repeated values stacked. Accept alternate justified summaries if their limitations for skew are explicitly discussed; do not accept center as evidence of spread.

Aligned dot plots



Assess: accurate representation; correct calculations/conventions; reasoning tied to evidence; contextual conclusion with units. Accept equivalent exact calculations and defensible explanations. Use the dimension rubric; record actual tool use separately where required.

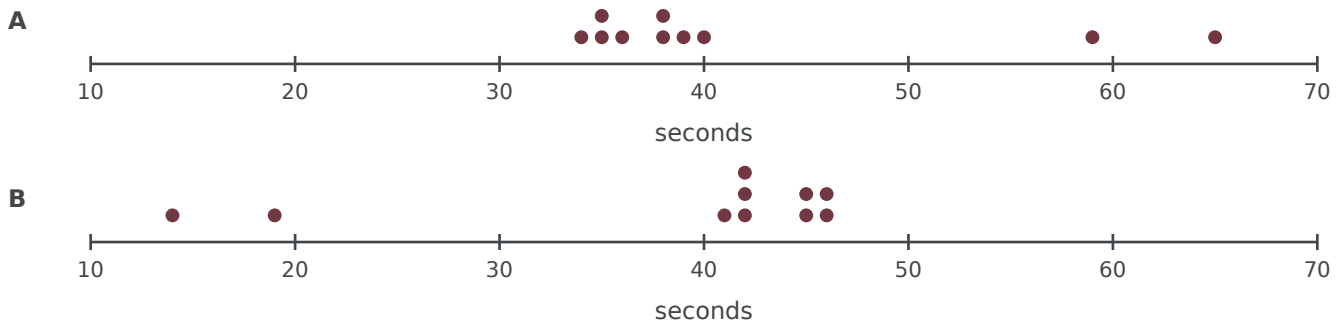
TEACHER KEY

002 • worked key

Target: Compare shape, appropriate centers, and spreads.

Batch A: Sorted data: 34, 35, 35, 36, 38, 38, 39, 40, 59, 65. $n = 10$, $\text{sum} = 419$; $\text{mean} = 419/10 = 41.9$. Five-number summary (min, Q1, median, Q3, max): (34, 35, 38, 40, 65). $\text{IQR} = 40 - 35 = 5$. Sum of squared deviations = 1060.9; population $\text{SD} = \sqrt{(1060.9/10)} = 10.3$. Range = 31. Fence interval: [27.5, 47.5]. Batch B: Sorted data: 14, 19, 41, 42, 42, 42, 45, 45, 46, 46. $n = 10$, $\text{sum} = 382$; $\text{mean} = 382/10 = 38.2$. Five-number summary (min, Q1, median, Q3, max): (14, 41, 42, 45, 46). $\text{IQR} = 45 - 41 = 4$. Sum of squared deviations = 1219.6; population $\text{SD} = \sqrt{(1219.6/10)} = 11.04$. Range = 32. Fence interval: [35, 51]. Shape A: right-skewed; B: left-skewed. A has a high-value tail and B a low-value tail. Median and IQR resist the extreme observations and are preferable for typical-value comparisons. Using median, higher center: B; $B - A = 4$ seconds. Using IQR, greater spread: A; $B - A = -1$ seconds. Center describes location while spread describes dispersion; shifting every value changes center without changing spread. Dot plots below show every observation, with repeated values stacked. Accept alternate justified summaries if their limitations for skew are explicitly discussed; do not accept center as evidence of spread.

Aligned dot plots



Assess: accurate representation; correct calculations/conventions; reasoning tied to evidence; contextual conclusion with units. Accept equivalent exact calculations and defensible explanations. Use the dimension rubric; record actual tool use separately where required.