Comparing Data Sets

Students compare two or more groups with the five-step procedure, discover that two classes with equal means differ once the shape picks the statistics, write comparisons in context with a sentence frame, and recommend a fertilizer from three.

TIME	45 minutes (one student with a parent or tutor, or a small group)
WHO	Math 1 (algebra readiness), about age 12. Follows Unit 12, Lesson 4. Closes Unit 12.
MATERIALS	Student worksheet (PDF), the Deep Dive 5 interactive page for this lesson (stacked box plots), pencil, calculator
PRIOR KNOWLEDGE	Shape (Lesson 1), center (Lesson 2), spread (Lesson 3), outliers (Lesson 4). Informal comparison of two groups (7th grade).
STANDARDS	NC.M1.S-ID.2, NC.M1.S-ID.3.
KEEP OUT	Statistical significance. Confidence intervals.

Learning goals

1. Carry out the five steps to compare groups on the same scale.
2. Choose the statistics that fit each shape, and the same kind for every group.
3. Explain why two groups with the same mean can differ, and write a comparison in context.
4. Recommend a choice using both center and spread.

Vocabulary: say both, every time

The rule for the whole lesson: whenever the adult or the student says a math word, they follow it with the plain-English version. Proper term first, plain English second, until the student does it without being asked.

TERM	LOOKS LIKE	PLAIN ENGLISH
Compare	alike and different	Shape, center, spread, context.
Consistent	little spread	Smaller IQR or σ.
Same kind	fair comparison	Median with median.
σ	whole group	A whole class.

> THE ONE SENTENCE TO SAY OUT LOUD
>
> Same scale, shape first, the statistics that fit, then say it in context.

Lesson timeline (45 minutes)

0:00 to 0:05	Warm-up: same mean? Show only the two means, 83.3 and 83. Ask: did the classes do the same? Hold the answer.
0:05 to 0:20	The five steps on the two classes. Stacked box plots in the tool. Shapes: skewed left with the 34, and symmetric. Choose the median and IQR for both. Compare: 87.5 against 83; 5 against 12.5. Read the model answer and the frame. Sigma, because a whole class.
0:20 to 0:30	Delia's fertilizers. Three stacked box plots. Center and spread. Recommend C. Spread across units.
0:30 to 0:41	Practice. The compare-and-write practice or Worksheet Parts A and B. Same buttons: Hint, Show next step, Reveal answer, Hide help. Every answer ends in a sentence.
0:41 to 0:45	Exit ticket. Worksheet Part E. Success looks like 1st period higher by the median, 4th period more consistent by the IQR, and the outlier reason.

Misconceptions to listen for

- **Same mean, same performance.** Check the shape first.
- **Mix a median with a mean.** Same kind for both.
- **Only compare centers.** Spread is half the story.
- **Numbers are the answer.** The sentence in context is.
- **s for a whole class.** A whole class is a population: σ.

Support and stretch

Support

Give the sentence frame on a card. Have the student point to the two boxes on the stacked plot while saying higher and more consistent.

Stretch

Ask what one change to 1st period's data (fixing the 34 to 84, say) would do to each statistic and to the comparison. Ask the student to collect two small real data sets and compare them with the five steps.

Where this goes next

Unit 13: properties of exponents. The exponents previewed in Unit 7 and the square roots from Units 11 and 12 get their rules.

> THE HABIT TO BUILD
>
> Same scale, shape first, the statistics that fit, the same kind for both, then a sentence in context.