Lesson 99 DATA & CHANCE

Comparing data sets and drawing inferences

CURRICULUM ALIGNMENT

DAT.DAT.4b critically analyse and evaluate findings; and communicate inferences, conclusions and implications from the findings.

DAT.DAT.4a pose questions, collect, compare, summarise and represent data selectively to answer those questions.

INTERACTIVES Stats Overlay (Mean / Median / Mode / Range) · display, explore

WHAT THIS LESSON TEACHES

The mean shows a typical value but sets with the same mean can have very different spreads or ranges.

→ Two classes each have a mean test score of 15.

→ 14, 15, 16 against 8, 12, 15, 15, 20, 20 have the same mean but different ranges.

MODEL THIS ON THE BOARD

FIND THE MEAN AND COMPARE SPREADS

1. Add all the scores then divide by how many scores there are to find the mean.
2. Subtract the smallest from the largest to find the range.
3. The set with the smaller range is more consistent.

DISCUSSION STARTER

REFLECT Could two data sets have the same mean but look very different? How?

LESSON ARC

Open with the two-spelling-test puzzle: same mean of 15, did the classes do the same? Put the two dot plots on the IWB and let pupils spot the spread before you name it. Work three side-by-side comparisons aloud, reading mean and range off each pair. Pupils record the two means and one number-backed inference in their copy. The Class Challenge runs a live class survey split into two groups.

TEACHING MOVES

1. **Getting Started.** Give five seconds of quiet think-time, then take two or three hands — not open call-outs. Do NOT settle the question. The whole point is to plant the doubt: can one number hide a different story?
2. **Watch and Notice.** Point at each dot plot in turn but stay silent on the second until pupils have looked — let them spot that the dots scatter. Hold the word 'spread' until a pupil offers it, then name it. Revoice: 'so the middle is the same, but one class is bunched and the other is scattered.'
3. **Compare Sets Side by Side.** Read the mean AND range aloud off each of the six plots before asking for the comparison sentence — teacher-led, no board turns here. On the outlier pair (5 and 6) ask 'which number is doing all the stretching?' and revoice: 'one score can pull the range wide open while the middle barely shifts.'

4. **Record and Infer in Your Copy.** Walk the room glancing that each inference names an actual number, not just 'more' or 'less'. If a pupil has written only a mean, prompt them to add the range too — the sentence isn't finished without it.
5. **Class Challenge.** Collect a quick raw set first (show of hands or fast round-the-room count), split into two sensible groups, then keep the board turns brisk. Insist every claim carries a number. If the live data throws up no lower-mean/smaller-spread group, drop in the prepared pair (11,12,12,13 against 8,12,16,20).
6. **What Did We Notice?.** Listen for pupils who separate centre from spread — a strong answer says the means are equal but the ranges differ. Revoice: 'two data sets can share a mean yet tell different stories, and it takes the range to see it.' Head off any claim that one number settles a comparison alone.

COMMON MISCONCEPTIONS

⚠ Pupils say 'both classes did the same because the mean is 15' and treat that as the end of it — one number closes the case.

Go back to the two dot plots. Cover the mean line and ask them to describe how stretched each set is. The identical means with a range of 2 against a range of 20 make the point visible: same centre, very different story.

⚠ Pupils assume the set with the higher mean must have the higher top score — so they expect Set A (mean 16) to reach further than Set B (mean 14).

Stop on plots 3 and 4. Point to Set A's top dot at 17 and Set B's at 21. A bigger mean does not mean bigger values throughout — bunched-up scores can lift the mean without any single high value.

⚠ In their inference sentence pupils write 'Class A is more consistent' but leave out the number that proves it.

Ask them: 'consistent by how much?' Point them back to the two dot plots to read off both ranges, then have them finish the sentence '...because its range is only 2, while Class B's is 12.'

DIFFERENTIATION

EMERGING

- Give these pupils just the first comparison (identical means, range 2 against range 20) to record — the clearest contrast — before joining the fuller board work.
- Provide the sentence frame '_____ is more consistent because its range is _____, while _____'s range is _____' so they only fill in the numbers they read off the plot.

DEVELOPING

- After the copy work, ask them to invent a third data set that shares the mean of 15 but has a range in between the two shown — then read it back to the class.
- On the second comparison, ask them to explain in writing how Set A can have the higher mean yet the lower top score.

PROFICIENT

- During the Class Challenge, hand them the lower-mean/smaller-spread group and ask them to build the case aloud for it being 'the better one' — narrate the argument for the class to weigh.
- Pose: could you design two sets with the same mean AND the same range that still tell different stories? Let them try in the copy and predict what a third measure might catch.

↗ **Cross-curricular:** Tie to PE — record two teams' shuttle-run times, then compare their means and ranges to argue which team is more consistent.

ANSWER KEY

Scaffold: visual check on the page

Q1: 15

Q2: 15

Q3: means 16 and 15; ranges 2 and 10

a) Never — Ranges can differ even when means are equal.

b) Always — This is always how the mean is calculated.

c) Always — Less spread shows values are closer together.

d) Never — Lowest values can differ while the mean stays the same.

S1: 32

S2: 30.5

S3: 9

S4: 33.5

S5: 40