

Mean, median, mode, range: measures of centre and spread

CURRICULUM ALIGNMENT

DAT.DAT.4a

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

DAT.DAT.4b

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

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

WHAT THIS LESSON TEACHES

The mean is the average: add all the values then share the total equally by how many values there are. The median is the middle value once ordered, the mode is the value that appears most, and the range is highest minus lowest.

→ Test scores 3, 5, 7, 7, 8 add to 30; 30 shared by 5 gives a mean of 6.

→ In 3, 5, 7, 7, 8 the middle value is 7, the mode is 7 and the range is $8 - 3 = 5$.

MODEL THIS ON THE BOARD

QUIZ SCORES 3, 5, 7, 7, 8

- 1 Write the scores in order: 3, 5, 7, 7, 8.
- 2 Mean: add them to get **30**, then share 30 by 5 to get **6**.
- 3 Median: the middle value is **7**.
- 4 Mode: **7** appears twice, more than any other.
- 5 Range: highest 8 minus lowest 3 is **5**.

LESSON ARC

Open with the five quiz scores (3, 5, 7, 7, 8) and ask pupils to pick one number to describe the whole group — no resolution yet. Move to three dot plots on the IWB and name mean, median, mode and range on each, saving the outlier set (1, 1, 2, 2, 9) for last. Pupils build sets together at the board, then work all four measures for 2, 3, 3, 4, 8 in their copy. Class Challenge is the practice round; the maths-talk pins down how one big value pulls the mean.

TEACHING MOVES

1. **Getting Started.** Take three hands-up answers on the 3, 5, 7, 7, 8 scores — don't judge any of them. Listen for 'the average', 'the middle', 'the most common'; those are the three measures you're about to name. Leave it unresolved: the point is that one number is a choice.
2. **Watch and Notice.** On the anchor set point at each overlay and name it aloud (mean 6, median 7, mode 7, range 5). On the outlier set 1, 1, 2, 2, 9, ask pupils to predict where the mean line lands before you reveal $15 \div 5 = 3$. Hold out for someone noticing the gap between the mean and median lines — that gap is the whole lesson.
3. **Try It Together.** Build one set at a time; clear the plot between sets. On 4, 6, 6, 8 flag it's an even count with two middle numbers — both 6 here, but when they differ you add and share by two. On 2, 3, 3, 4, 8 ask the class to predict whether mean or median lands further out before reading them off (mean 4, median 3).

4. **Work the Four Measures in Your Copy.** Pupils work all four statistics for 2, 3, 3, 4, 8 as a labelled four-line summary. Walk the room glancing for two slips: median chosen without ordering first, and range worked as biggest minus smallest. This is practice, not marking — no grading.
5. **Class Challenge.** Brisk turns at the board, Check after each — confirm and move on, don't re-explain. On the final set 1, 2, 2, 15 pause before Check: median is 2 but mean is 5. Ask why the average beat three of the four scores — the 15 is what does it.
6. **What Did We Notice?.** Steer the comparison to the two named sets so the outlier is the clear variable. Revoice a strong answer: 'when one score is much bigger than the rest, the mean gets pulled toward it but the median stays put.' If a pupil offers the small anchor-set gap as evidence, redirect — that's set shape, not an outlier.

COMMON MISCONCEPTIONS

⚠ A pupil looks at 5, 3, 8 and says the median is 3, picking the number that's physically in the middle of the list without ordering first.

Stop and drag the dots onto the plot so the class sees smallest-to-biggest, then re-read the middle as 5. Make ordering the first move every time before the median is chosen.

⚠ 'The average is always in the middle of the group' — pupils treat the mean as the fair middle even when one score is far out.

Put 1, 2, 2, 15 back on the plot beside 4, 6, 6, 8. Show the mean line sitting at 5, above three of the four dots, while the median holds at 2. Name the median as the fairer middle when there's an outlier.

⚠ On 2, 4, 6, 8, 10 a pupil hunts for a mode and picks one at random, assuming every set must have one. Ask which value repeats — none do. State plainly that a set can have no mode, and contrast with 1, 1, 2, 2, 9 where two values tie, so it has two modes.

DIFFERENTIATION

EMERGING

- Give these pupils a set already ordered on the copybook number line so they only pick out the middle, not sort first.
- Stay with odd-count sets that have a single clear middle value; hold off the even-count 'add the two middles' rule until they're secure.

DEVELOPING

- After the copy work, ask them to invent a five-number set whose mode is 3 and whose range is 6 — more than one answer works.
- On 2, 3, 3, 4, 8 ask by how much the mean would drop if the 8 were replaced by a 4.

PROFICIENT

- During the Class Challenge, narrate a harder variant: 'build me a four-number set where the mean is 5 but no value equals 5' — let them reason it out at the board.
- Pose: 'a set has five values, mode 2, median 4, mean 6 — is that possible? Show a set or explain why not' as a copybook investigation.

✍ **Cross-curricular:** Tie to PE — record how many skips each pupil managed in one minute, then find the class mean, median and range from the real data.

ANSWER KEY

Scaffold: visual check on the page

Q1: 6

Q2: 5

Q3: mean=5, median=2, mode=2, range=14

a) Always : That is exactly the rule for finding the mean.

b) Sometimes : It is when there is an odd count, but for an even count it can be halfway between two values.

c) Always : That is the definition of the mode.

d) Sometimes : It does for balanced sets such as 4, 6, 6, 8 but not for skewed sets such as 1, 2, 2, 15.

EXTENSION SHEET · STRETCH ANSWERS

S1: 32

S2: 33.5

S3: €32.50

S4: 32

S5: 30