



Key focus

This objective covers the three measures of centre (mean, median, mode) and the one measure of spread taught at this stage (range). Every task in this LO shows a real dot plot: students should read the mode (tallest stack), median (middle dot, or the average of the two middle dots when there's an even number of values), and range (first-to-last occupied value) directly off the display, and only calculate the mean numerically. Discourage the word “average” – always require students to name the specific measure. The beta textbook reference is Ex 30.01, pg 562.

Suggested teaching sequence

1. Introduce a dot plot and model reading the mode (tallest stack) and range (first to last occupied value) directly, with no calculation needed.
2. Model reading the median on an odd-count dot plot (a single middle dot), then on an even-count one (average the two middle dots) – this is the most common point of confusion, so contrast the two explicitly.
3. Model calculating the mean by adding every value and dividing by the count, distinguishing it clearly from the median (which is a position, not a calculation).
4. Practise working backwards from a stated mean and a set of known values to find one missing value, using $\text{total} = \text{mean} \times \text{count}$.
5. Introduce a data set with a clear outlier. Ask which measure – mean or median – better represents a “typical” value, and have students justify using the actual numbers.
6. Quantify the outlier's effect: recalculate the mean with and without the outlier, and compare how much the mean shifts versus how little the median shifts.
7. Discuss why the range is far more sensitive to a single extreme value than the median is (the range only uses the two endpoints; the median depends on position, which barely changes when one extreme is removed).
8. Critique real-world uses of the word “average” (news reports, sports statistics) by asking which specific measure is actually meant, and whether that choice suits the data.

Core examples to model

- Odd vs. even median: 9 values have a single middle dot for the median; 8 values need the average of the 4th and 5th sorted values.
- Working backwards: 4 known scores (140, 145, 155, 160) plus a mean of 150 across 5 games gives a missing score of $150 \times 5 - 600 = 150$.
- Outlier judgement: family allowances of \$4, \$4, \$5, \$5, \$5, \$6, \$20 have mean \$7 but median \$5 – the median better represents what most families actually receive.
- Outlier's uneven effect: removing the single largest score from a 6-value set can shift the mean substantially while the median barely moves, and the range can more than halve.

Watch for

- Saying “average” without naming mean, median, or mode – always require the specific term, since the three measures can give quite different values on the same data.
- Forgetting to average the two middle values for an even-count median, or averaging when the count is actually odd.
- Assuming the mean is always the best measure of centre: a data set with an outlier is usually better summarised by the median.
- Confusing range with an average measure of spread – range only compares the two most extreme values, so one outlier can inflate it dramatically while telling you nothing about the rest of the data.
- Trying to find a missing value from a mean by looking at the known values directly, rather than first reconstructing the total ($\text{mean} \times \text{count}$).

Checks for understanding

- Can students read the mode and range directly off a dot plot with no calculation?
- Can they correctly find the median for both an odd-count and an even-count data set?
- Can they calculate the mean accurately from a dot plot's values?
- Can they work backwards from a stated mean to find a missing data value?
- Can they judge whether the mean or median better represents a data set containing an outlier, and justify the choice?
- Can they explain why the range is more sensitive to a single outlier than the median is?
- Do they consistently name the specific measure rather than saying “average”?