Key focus

This objective asks students to match a data-collection scenario to the single most appropriate statistical display from a set of eight – bar graph, pie chart, pictogram, histogram, line graph (time series), dot plot, scatter plot, and box-and-whisker graph – and to justify that choice. The decision turns on the nature of the data (categorical vs numerical, individual values vs grouped intervals, one variable vs a relationship between two, a snapshot vs change over time) and on what the display needs to communicate (a count, a proportion, a trend, a comparison, or a spread). A strong justification always names the display *and* ties the choice to a concrete feature of the data or the question being asked, never just "because it looks right."

Suggested teaching sequence

1. Split the eight displays into two families first: categorical (bar graph, pie chart, pictogram) and numerical (histogram, line graph, dot plot, scatter plot, box-and-whisker graph).
2. Inside the numerical family, sort further by structure: dot plot (individual values, a small data set), histogram (grouped intervals, a larger or continuous data set), line graph (values recorded over successive time points), scatter plot (two variables measured on the same subjects), box-and-whisker graph (a five-number summary, often used to compare groups).
3. Model the bar-graph-vs-histogram distinction explicitly and repeatedly: a bar graph's gaps signal separate, unordered categories; a histogram's touching bars signal a continuous numerical scale that has been grouped into intervals.
4. Work through scenarios where two displays look superficially possible (e.g. a small vs a large data set choosing between a dot plot and a histogram) and have students argue for one using a specific feature of the data.
5. Frame the pictogram and the scatter plot as displays chosen for a particular communicative purpose – an easy-to-read visual count, or showing a relationship – rather than as an option every data set could use.
6. Practise critiquing a poorly chosen display (e.g. a pie chart used for data collected over time) by naming precisely what information it hides or misrepresents.
7. Use the opportunity to revisit sample vs census when discussing how the underlying data for a display was collected.

Core examples to model

- Categorical, comparing frequencies: favourite lunch option in a class ⇒ bar graph (the gaps show separate categories).
- Categorical, parts of a whole: proportion of a class choosing each of three sports ⇒ pie chart (sectors show proportion of the whole).
- Grouped continuous data: parcel weights sorted into 10 kg intervals ⇒ histogram (bars touch – no gaps in the numerical scale).
- Change over time: monthly ice-cream sales for a year ⇒ line graph / time series (a pie chart

cannot show a trend).

- Small set of individual whole-number values: the exact number of pets owned by each student in a class of 10 ⇒ dot plot (every value stays visible).
- Relationship between two numerical variables: hours of sleep vs a concentration score ⇒ scatter plot.
- Comparing spread and median of two or more groups: two classes' spelling test scores ⇒ box-and-whisker graph (side by side).
- Easy-to-read counts: medals won by four countries ⇒ pictogram (repeated icons).

Watch for

- Treating a bar graph and a histogram as interchangeable – the gap (or lack of one) between bars carries real meaning about the structure of the data, not just a style choice.
- Choosing a pie chart for data collected over time, or for more than about six categories, where the sectors become too thin to read.
- Choosing a histogram or bar graph when the individual values matter and the data set is small enough that a dot plot would keep every value visible.
- Forgetting that a scatter plot needs two numerical variables measured on the same subjects – a single variable alone cannot make a scatter plot.
- Justifying a display choice by saying it "looks right" instead of naming a feature of the data – categorical vs numerical, grouped vs individual, a snapshot vs change over time.
- Assuming there is only ever one correct display – some scenarios (e.g. a small set of whole-number counts) can reasonably suit two displays, and the justification should still explain the trade-off between them.

Checks for understanding

- Can students sort the eight displays into a categorical family and a numerical family?
- Can they explain the structural difference between a bar graph and a histogram, rather than just naming it?
- Can they choose between a dot plot and a histogram based on the size of the data set and whether individual values matter?
- Can they recognise when a scatter plot, a pictogram, or a box-and-whisker graph is the right tool, not just default to the familiar bar graph, pie chart, or line graph?
- Can they critique a poorly chosen display by naming exactly what it hides or misrepresents?
- Can they justify a display choice using a genuine feature of the data, rather than a general impression?