Pictures of Data and Their Shapes

Students meet the three questions (shape, center, spread), compare dot plots, histograms, and box plots and when to use each, read the 5-number summary, and name shapes by the tail with context explanations.

TIME	40 minutes (one student with a parent or tutor, or a small group)
WHO	Math 1 (algebra readiness), about age 12. Follows Unit 11. Opens Unit 12.
MATERIALS	Student worksheet (PDF), the Deep Dive 5 interactive page for this lesson (statistics tool), pencil. A graphing calculator can draw the plots instead.
PRIOR KNOWLEDGE	Dot plots, histograms, box plots, median, and quartiles (6th grade, 6.SP.4 and 6.SP.5).
STANDARDS	NC.M1.S-ID.1, NC.M1.S-ID.3.
KEEP OUT	Computing the mean and standard deviation (Lessons 2 and 3). The outlier rule (Lesson 4).

Learning goals

1. Say the three questions in order and choose the plot that fits a question.
2. Read and write a 5-number summary and describe what the box shows.
3. Name a shape by its tail: symmetric, skewed right, skewed left.
4. Explain a shape from the context.

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
Distribution	how values spread	Picture it.
Dot plot, histogram, box plot	three pictures	Every value; bins; 5-number summary.
5-number summary	min, Q1, median, Q3, max	Read it off the box plot.
Skewed	a long tail	Right toward big numbers, left toward small.

> THE ONE SENTENCE TO SAY OUT LOUD
>
> Shape, center, spread, every time. The tail tells you the name.

Lesson timeline (40 minutes)

0:00 to 0:05	Warm-up: one quantity. Everyone writes how many songs (or books, or texts) this week. Line up the numbers. Ask: what does this list look like?
0:05 to 0:17	Mini-lesson: three pictures. The songs data in the tool: dot plot, histogram with bin widths 5, 10, 20, box plot. Read the 5-number summary. Which picture for which question.
0:17 to 0:27	Shape. Find the tail. Incomes, easy test, heights, with the reasons. The songs are skewed right.
0:27 to 0:36	Sort and practice. The shape sorter, then the practice problems or Worksheet Parts A to D. Same buttons: Hint, Show next step, Reveal answer, Hide help.
0:36 to 0:40	Exit ticket. Worksheet Part E. Success looks like the three questions in order and skewed right with the tail reason.

Misconceptions to listen for

- **Skewed right means the pile is on the right.** The tail is on the right.
- **The box is the whole data.** It is the middle half.
- **A histogram shows individual values.** It shows counts in bins.
- **Only one bin width is correct.** Different widths show different detail.

Support and stretch

Support

Have the student trace the tail with a finger and say which direction it points before naming the shape. Keep the three pictures of the same data side by side.

Stretch

Ask what bin width hides the 88 in the songs histogram and why that is a problem. Ask for a real data set that would be skewed left.

Where this goes next

Lesson 2: center. The mean and the median, and why the median resists extreme values.

> THE HABIT TO BUILD
>
> Picture it, find the tail, name the shape, then say it in context.