Graphing Stories: Match the Picture to the Story

Students translate both ways between a story and a graph: telling the story a graph shows with the behavior words, sketching a graph from a story by shape, and matching graphs to stories, including the distance-versus-speed mix-up.

TIME	40 minutes (one student with a parent or tutor, or a small group)
WHO	Math 1 (algebra readiness), about age 12. Follows Unit 2, Lesson 4 (reading a graph: the behaviors).
MATERIALS	Student worksheet (PDF), the Deep Dive 5 interactive page for this lesson, pencil, blank grids or graph paper
PRIOR KNOWLEDGE	The five behaviors (Lesson 4): intercepts, increasing and decreasing, positive and negative, maximum and minimum, end behavior.
STANDARDS	NC Math 1 NC.M1.F-IF.4 (interpret key features of graphs in context) and NC.M1.F-IF.7. Qualitative graphs from grade 8 (8.F.5).
KEEP OUT	No formulas, no slope numbers (Unit 3). Shape only.

Learning goals

1. Tell the story a graph shows, one stretch at a time, using climbing, flat, falling, steeper, and the intercepts and maximum in story words.
2. Sketch a graph from a story by shape: climb, level off, drop, or jump, fast or slow, with labeled axes.
3. Match graphs to stories and explain each match by its stretches.
4. Explain why a flat stretch means stopped on a distance graph but steady motion on a speed graph.

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
Climbs, drops	rising, falling	The output is growing or shrinking. Steep if fast.
Flat, level	a horizontal stretch	The output is not changing: stopped, resting, steady.
Jumps	a vertical step	A sudden change all at once.
Steeper means faster	compare two climbs	More change in each minute.
Distance graph, speed graph	read the y-axis label	Same shape, different story. Flat on distance is stopped; flat on speed is steady.

> THE ONE SENTENCE TO SAY OUT LOUD
>
> Walk the graph left to right and name each stretch: climbing, flat, falling. Read the axis label before you say what a stretch means. Steeper means faster.

Lesson timeline (40 minutes)

0:00 to 0:05	Warm-up: tell me a story. Show the distance-from-home graph (climb, flat, drop). Ask the student to narrate it as if it were their afternoon. Listen for the flat stretch: "I stopped." Correct "I walked steadily" gently: what is the axis measuring?
0:05 to 0:14	Mini-lesson: four shapes. Climb, level off, drop, jump. Draw each on the board with a story. Introduce steeper means faster with two climbs to the same height in different times. Then sketch the bathtub story together, one stretch at a time, and ask which sloped stretch is steeper and why.
0:14 to 0:26	Sort and match. The Which shape sorting activity, then the four-graph match. For each match, have the student say the stretches out loud in order before choosing. Then the distance-or-speed match: sketch the runner's speed graph on paper first, then find it.
0:26 to 0:35	Practice. Interactive practice problems or Worksheet Parts A to D. Same buttons: Hint, Show next step, Reveal answer, Hide help. For sketches, check axis labels and the order of shapes, not exact numbers.
0:35 to 0:40	Exit ticket. Worksheet Part E or an index card: what flat and a steep climb mean on a distance graph, and the plane's height graph stretch by stretch. Success looks like: stopped, moving away fast; level, level, steep climb.

Misconceptions to listen for

- **Flat means steady motion.** On a distance graph it means stopped. The most common trap in the unit; keep returning to what the axis measures.
- **The trip home is a climb because I am moving.** Distance from home is shrinking, so the graph drops.
- **A paycheck is a climb.** Money arriving all at once is a jump.
- **Every graph starts at zero.** A story can start at a friend's house: the graph starts up high.
- **Steeper means more.** Steeper means faster: more change per minute, not a bigger total.
- **Reading the picture as a map.** A distance-time graph is not a drawing of the path. Going up on the graph is not going uphill.

Support and stretch

Support

Act the stories out: walk away, stop, walk back, while a partner draws. Give the four shapes as cards to lay in order before sketching. Keep the axis labels written on every grid before the student draws.

Stretch

Ask for a story that produces two jumps and a drop. Give a speed graph and ask for the matching distance graph. Ask what the graph of distance from a friend's house would look like for the same walk that started at home.

Where this goes next

Lesson 6: average rate of change. Steeper means faster gets a number: how much the output changes for each step of the input, over a stretch. That number is the bridge to slope in Unit 3.

> THE HABIT TO BUILD
>
> Before saying what any stretch means, read the axis label out loud. Then walk the graph left to right and name each stretch.