Qualitative Graphs Worksheet: Sketching Rise, Fall, and Plateau Stories

Qualitative Graphs: Rise, Fall, Plateau

Reading a story as a graph: identify quantities, list events, label axes, sketch segments, interpret each segment.

Qualitative graphs show the shape of a relationship—rising, falling, or flat—without exact numbers. In this lesson, students read short scenarios, sketch a graph on blank axes, and write one sentence interpreting each segment. The focus is on matching story events to graph features: increasing sections, decreasing sections, plateaus, and steepness changes. A consistent convention is used: the horizontal axis represents the independent quantity named in the story (often time),

and the vertical axis represents the dependent quantity. No numerical scale is required, but students should label axes and mark key points with words or simple symbols. Because handwriting and sketching vary, the rubric accepts any clear, consistent representation that matches the story's qualitative features.

Start by identifying the two quantities in the story. Ask: what is changing, and what is it changing with respect to? For example, in a bathtub story, the water volume changes as time passes. Time usually goes on the horizontal axis, and the changing quantity goes on the vertical axis. Then break the story into segments. Each segment describes one behavior: the quantity rises, falls, stays the same, or changes steepness. A rising segment is a line or curve going up from left

to right. A falling segment goes down. A plateau is flat. Steepness is qualitative: a steeper rise means the quantity increases faster, not a specific numerical rate.

Use a simple convention for sketching. Draw axes with arrows. Label the horizontal axis with the independent quantity and the vertical axis with the dependent quantity. You do not need a numbered scale. Mark the start and end of each segment with short vertical dashed lines or labeled points such as A, B, C. Write one sentence under the graph for each segment, for example: 'From A to B, the water level rises quickly as the tub fills.' If the story says 'then the water stays

at the same level,' draw a flat segment. If it says 'drains slowly,' draw a gentle downward segment. The graph is qualitative, so exact heights and widths are not graded; the sequence and shape are.

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Sketching Steps

Five-step sketching procedure.

1. Underline the changing quantity and the quantity it changes with respect to.
2. List the story events in order and label each as rise, fall, plateau, or change in steepness.
3. Draw and label axes using the convention: independent quantity horizontal, dependent quantity vertical.
4. Sketch one segment per event, connecting them left to right, and mark segment boundaries.
5. Write one interpretation sentence per segment using the story's words.

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Interpreting Segments and Steepness

Interpretation vs description; valid alternatives.

Interpretation means saying what a segment means in the story, not just describing the line. 'The line goes up' is a description; 'the water level rises because the tap is on' is an interpretation. For a plateau, say what stays constant and why. For a fall, say what decreases. For a change in steepness, compare the rates qualitatively: 'the water rises more slowly after the tap is turned down.' Avoid claiming exact values unless the story gives them. If a story says 'fills

quickly, then slowly,' the first rising segment should be steeper than the second. If a story says 'drains completely,' the graph should return to the starting vertical level, often zero if the axis starts at zero.

Valid alternatives exist. A student might draw smooth curves instead of straight segments, or use a different but consistent axis orientation if the story clearly supports it. The rubric checks that the sequence of rise, fall, and plateau matches the story, that axes are labeled, and that each segment has a correct interpretation sentence. Handwriting and line style are not graded for neatness alone; clarity and consistency matter.

Steps: 1. For each segment, name the behavior: rising, falling, flat, steeper, or gentler. 2. Connect the behavior to the story event that causes it. 3. Check that the order of segments matches the order of events. 4. Check that a complete drain returns to the starting level if the story says so. 5. Write interpretation sentences that mention the story quantities, not just the line direction.

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Common Sketching Conventions and Alternatives

Conventions and accepted alternatives.

This lesson uses one explicit convention: horizontal axis for the independent quantity, vertical axis for the dependent quantity, left-to-right time order when time is involved. Students may use straight segments or smooth curves as long as the qualitative shape is clear. They may mark segment boundaries with letters, dashed lines, or labels. They may start the vertical axis at zero or at another convenient level, but if a story says 'empty' or 'none,' the graph should show

the dependent quantity at its lowest shown level. Numerical values are hypothetical examples only; no printer tolerances or hardware standards are assumed. Measure actual classroom equipment if a physical demonstration is used, and label any chosen numbers as examples.

Because handwriting varies, the rubric does not require a single universal answer. A correct graph must be readable, labeled, and consistent with the story. Two students may draw different curve shapes and both be correct if the rise-fall-plateau sequence and relative steepness match. The interpretation sentences are the main evidence of understanding.

Steps: 1. Label both axes with words, not just symbols. 2. Use arrows on axes to show direction. 3. Mark at least the start and end of each story segment. 4. Keep one consistent convention throughout the graph. 5. Write sentences that a classmate could match to the story without seeing the graph.

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Common Mistakes and Fixes

Four mistakes with fixes.

Mistake 1: Drawing a rising line for a story event where the quantity stays the same. Fix: Re-read the event and ask whether the quantity changes. If it stays constant, draw a flat plateau and write a sentence saying what remains constant.

Mistake 2: Labeling axes with numbers that are not in the story and treating them as exact. Fix: Use word labels for qualitative graphs. If you add example numbers, mark them as hypothetical and do not use them to grade exact heights.

Mistake 3: Writing 'the line goes up' instead of interpreting the segment. Fix: Name the story quantity and the cause: 'the water level rises because the tap is on.'

Mistake 4: Making all rising segments equally steep when the story says one part is faster. Fix: Compare steepness qualitatively: draw the faster rise steeper and the slower rise gentler, then explain the comparison in a sentence.

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FAQ

Four FAQ items.

Q: Do qualitative graphs need a numbered scale? A: No. A qualitative graph needs labeled axes and a clear shape. Numbers are optional and, if used, should be labeled as hypothetical examples unless the story provides them.

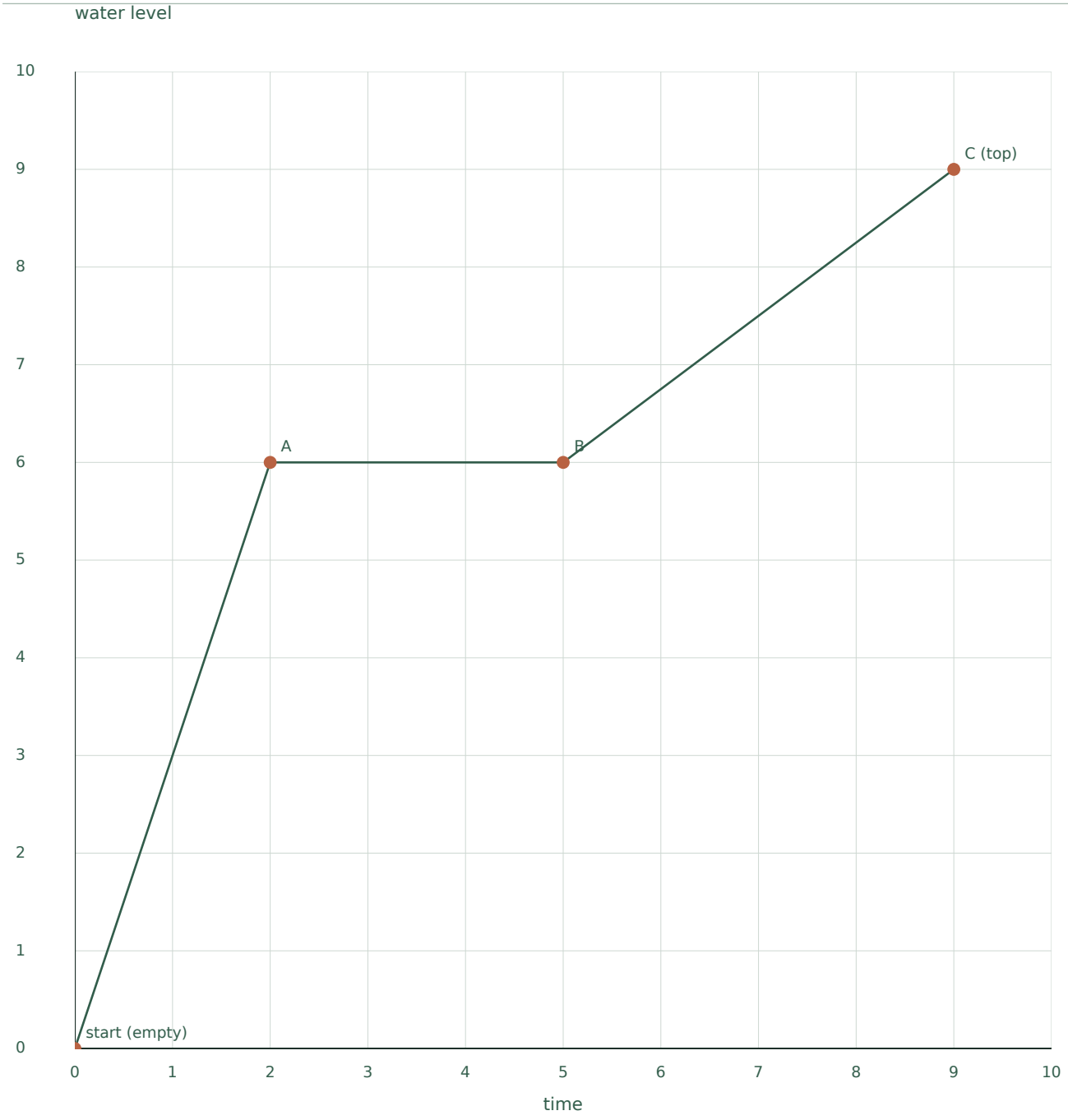
Q: Can I use curves instead of straight lines? A: Yes, if the curve clearly shows the required rise, fall, plateau, or steepness change. The rubric accepts any clear, consistent representation.

Q: What if the story does not mention time? A: Use the independent quantity named in the story on the horizontal axis. For example, if depth changes with volume, put volume on the horizontal axis and depth on the vertical axis.

Q: How many sentences should each segment have? A: One clear interpretation sentence per segment is enough. It should name the behavior and connect it to the story event.

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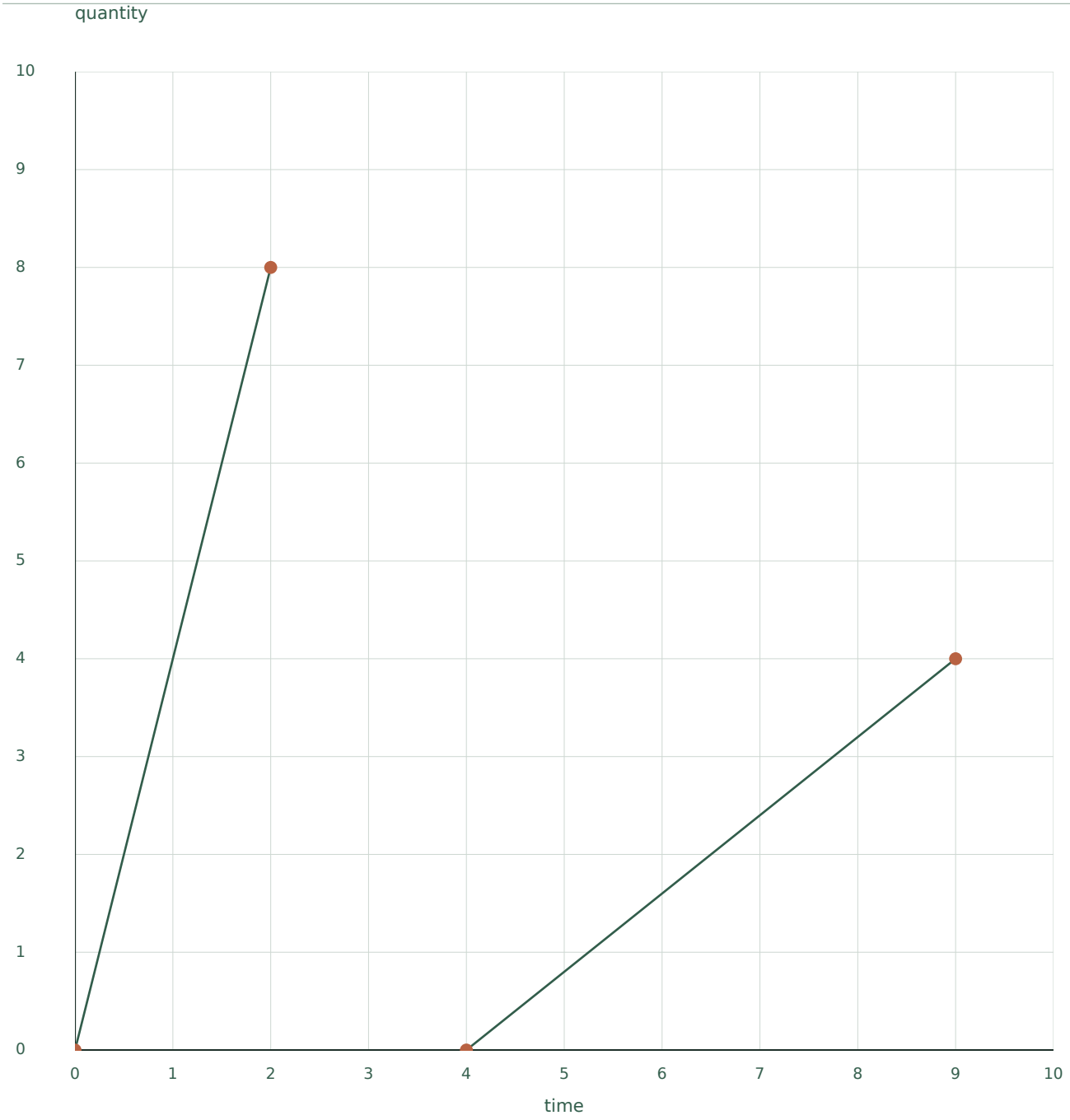
Worked Example: Filling a Water Bottle



Model sketch. Axes labeled with words; segment boundaries marked A, B, C. Sentences: 'From start to A, the water level rises quickly because the bottle is being filled.' 'From A to B, the water level stays the same','the

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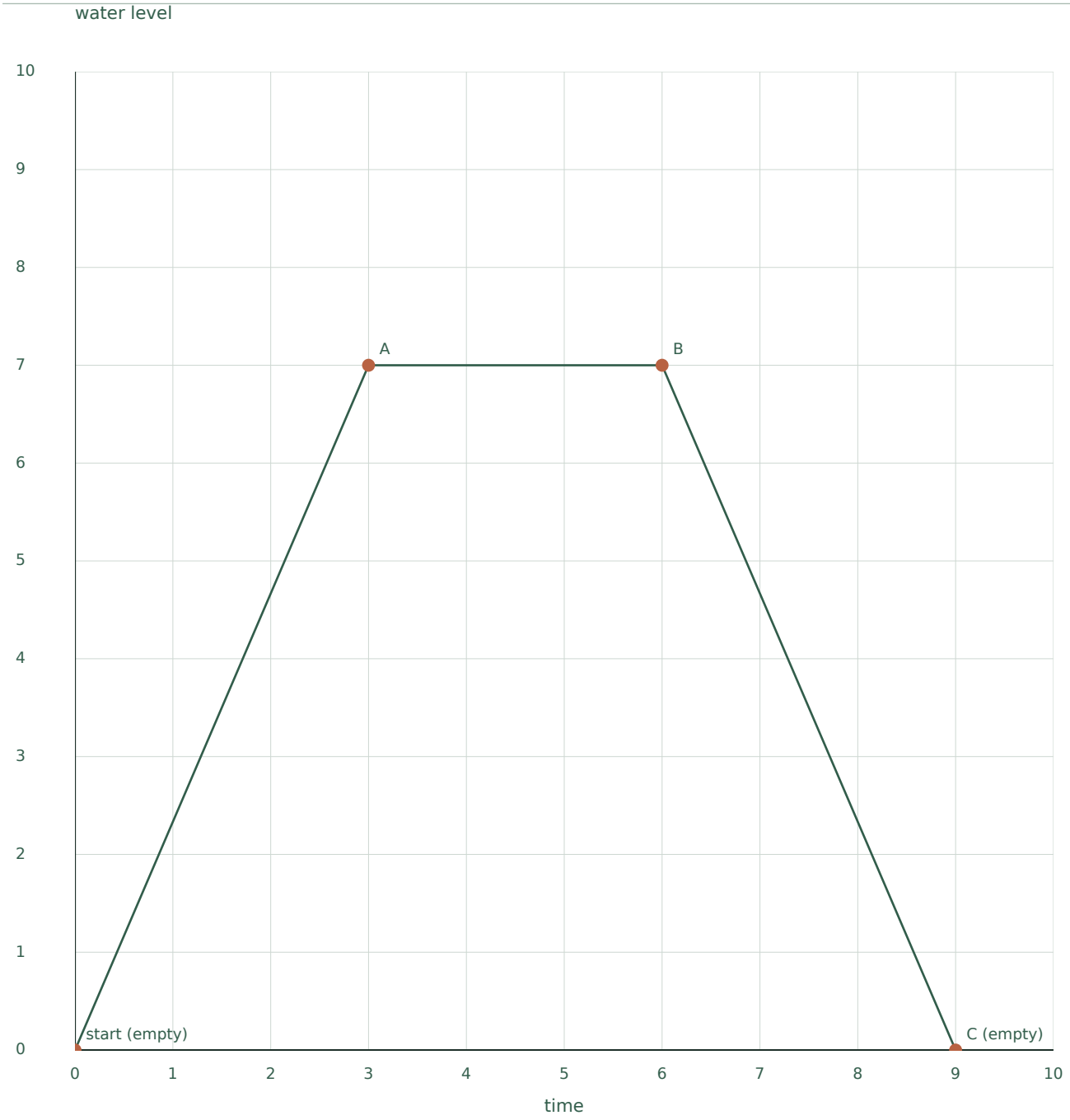
Steepness Comparison: Steep Rise vs Gentle Rise



Steepness is qualitative: the steeper rise means the quantity increases faster; the gentler rise means it increases more slowly. No exact rates are claimed.

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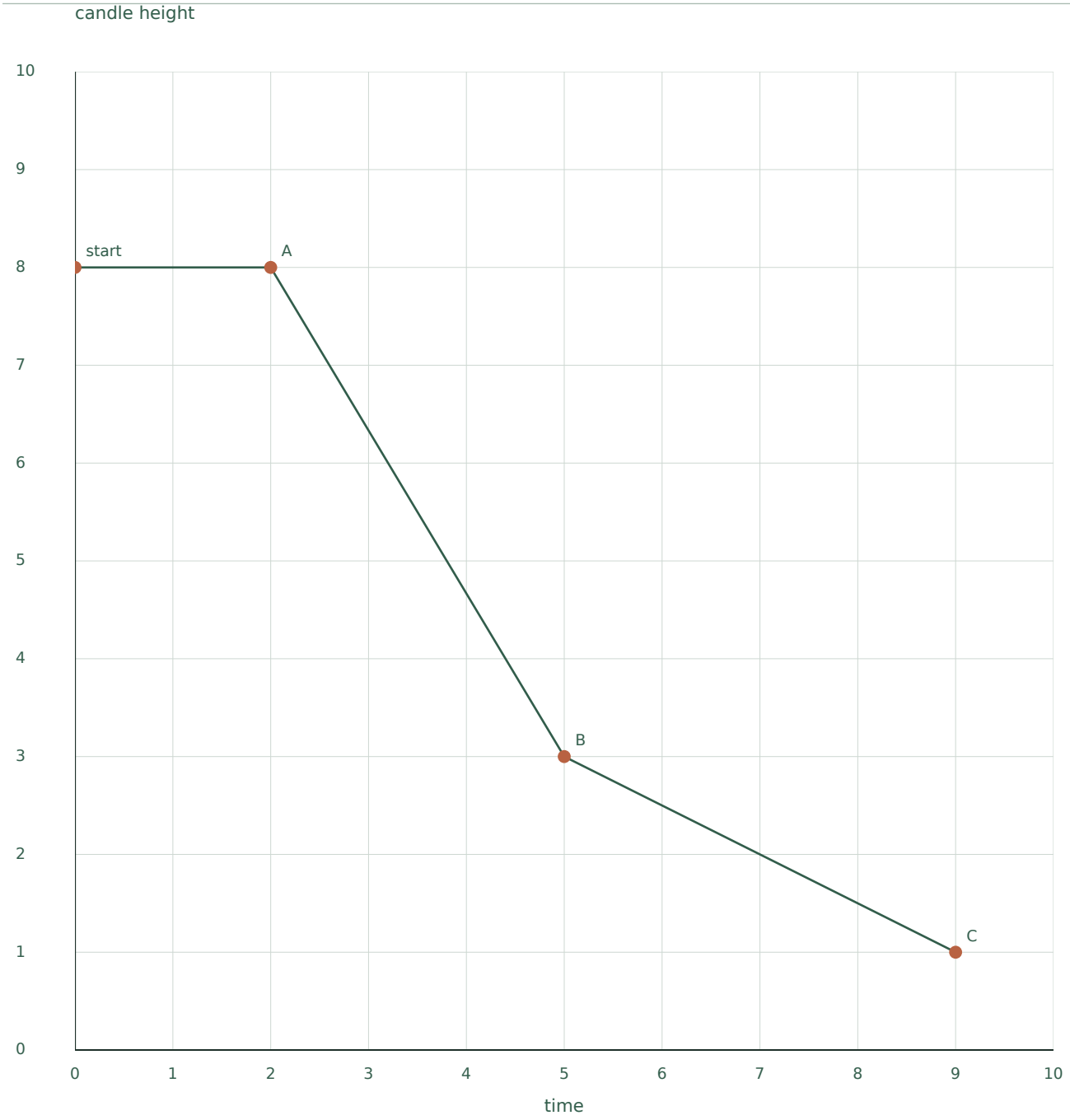
Model: Bathtub Rise, Plateau, Fall



Model sketch. Sentences: 'The water level rises steadily while the tap is on.' 'The water level stays the same while the tap is off.' 'The water level falls until the tub is empty when the drain is opened.'

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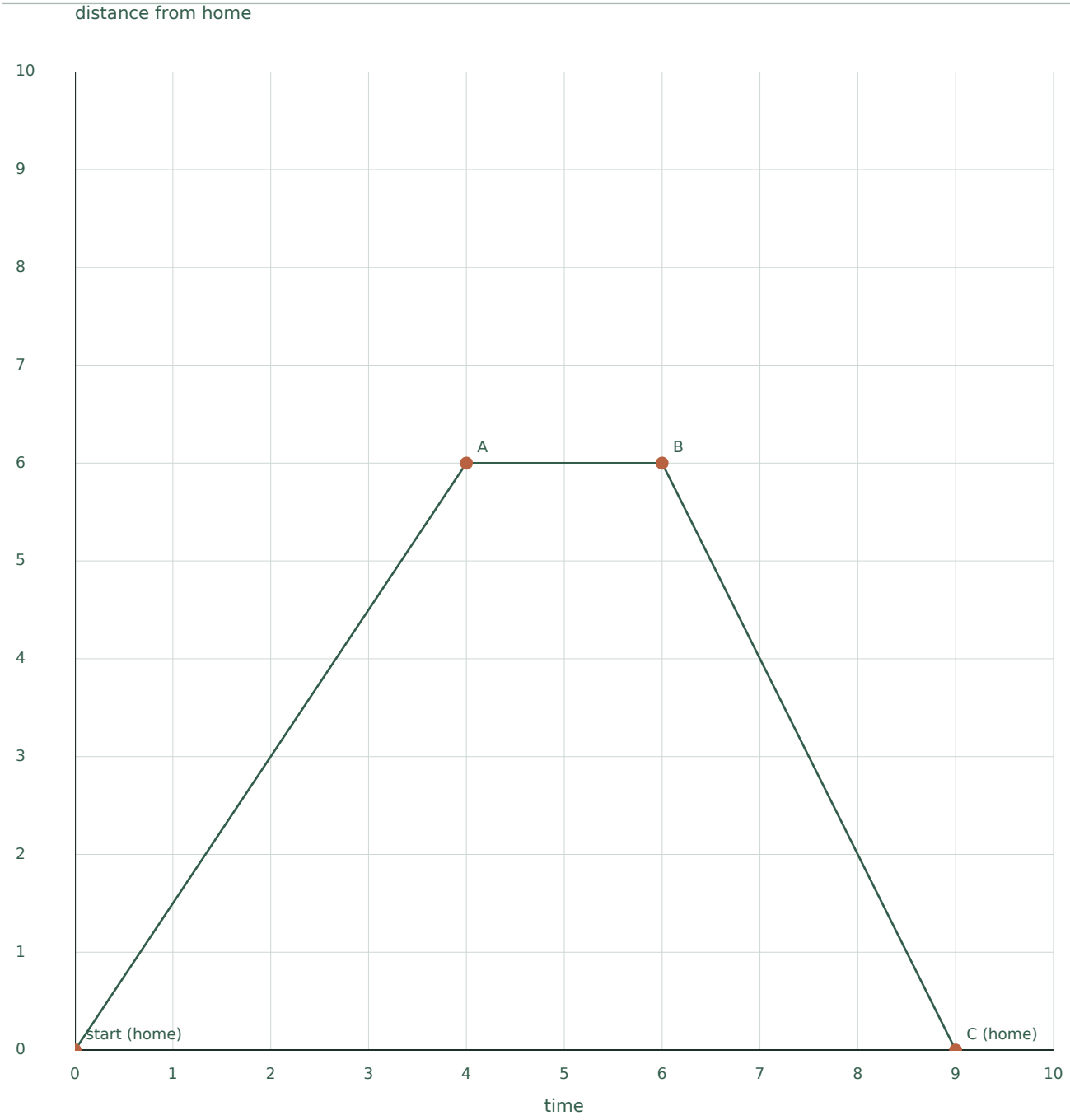
Model: Candle Plateau, Fast Fall, Slow Fall



Model sketch. Sentences: 'The candle height stays the same at first after it is lit.' 'The candle height falls quickly as it burns.' 'The candle height falls more slowly later.'

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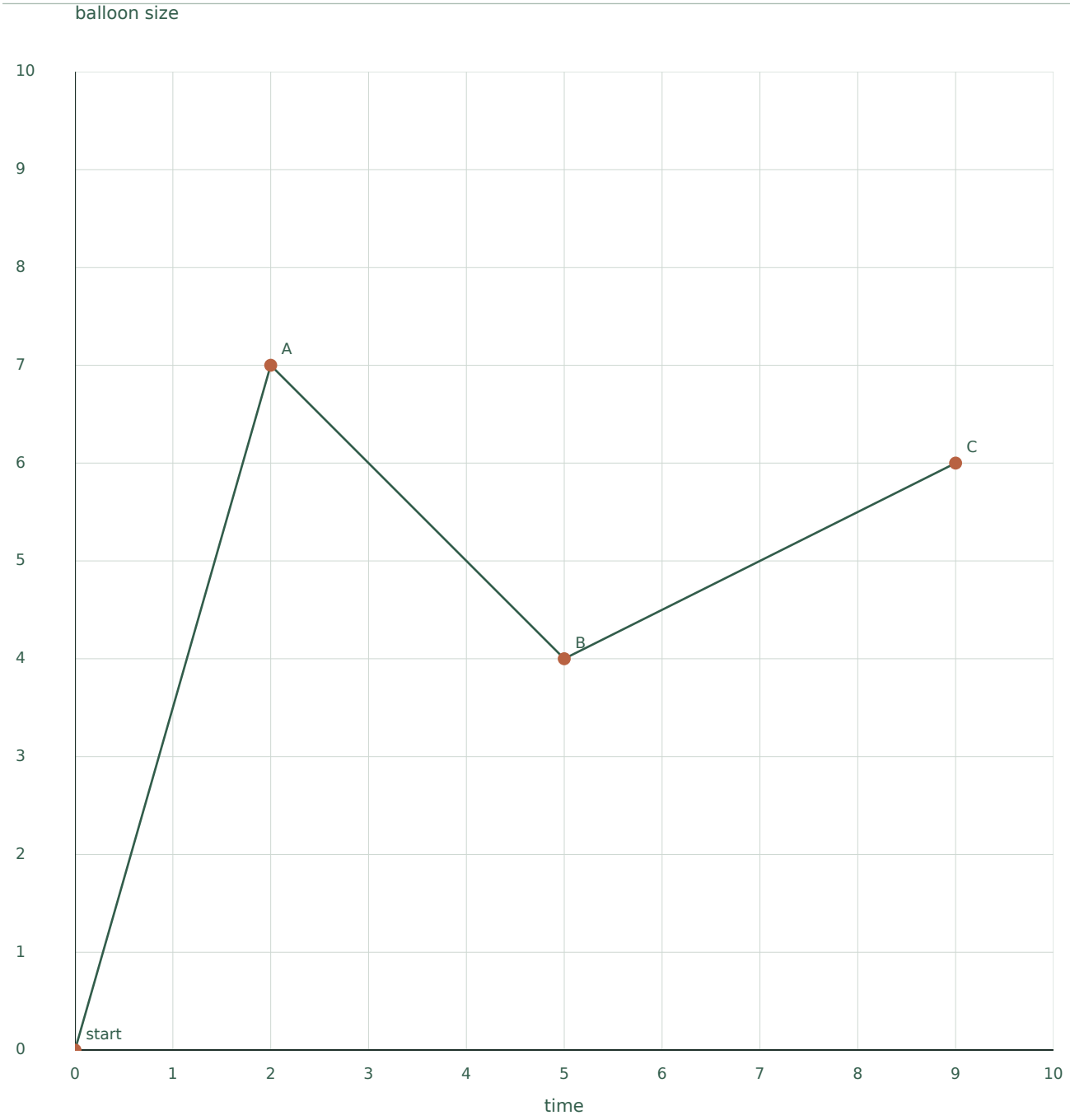
Model: Walk Away, Rest, Walk Back Faster



Model sketch. Sentences: 'The distance from home increases steadily as the person walks away.' 'The distance stays the same while the person rests.' 'The distance decreases quickly as the person walks back home faster.'

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Model: Balloon Fast Inflate, Slow Deflate, Slow Inflate



Model sketch. Sentences: 'The balloon size increases quickly during the first inflation.' 'The balloon size decreases slowly as air is let out.' 'The balloon size increases more slowly during the second inflation.'