Draw a Parabola's Axis of Symmetry: Vertex, Vertical Line, and Check

Original tasks 1, 2, 3 / complete keys

Task 1

A pre-drawn downward-opening parabola has its highest point at (-1, 4). State the axis of symmetry and describe how to draw it on the grid.

Answer: The axis is x = -1. Draw a dashed vertical line through x = -1, passing through the vertex (-1, 4) and extending above and below it; label the line x = -1.

Reason: The vertex x-coordinate is -1. A vertical line through that x-value is the axis of symmetry, and the y-coordinate 4 does not change the line equation.

Check: Choose a horizontal grid line crossing the parabola at two points. If the x-coordinates average to -1, the axis is confirmed.

Task 2

A parabola has vertex (0, 1). A horizontal line crosses it at x = -4 and x = 4. Find the axis of symmetry and verify it with arithmetic.

Answer: The axis is x = 0. Verification: (-4 + 4) / 2 = 0, matching the vertex x-coordinate.

Reason: The vertex gives x = 0 directly. The paired points at equal height are symmetric about x = 0 because their average is 0.

Check: Confirm that the drawn dashed line is the y-axis and that both paired points are four units from it.

Task 3

A parabola has vertex (2.5, -1). A horizontal line crosses it at x = 1 and x = 4. Find the axis and explain whether the check supports it.

Answer: The axis is x = 2.5. The check gives (1 + 4) / 2 = 2.5, so it supports the axis.

Reason: The vertex x-coordinate is 2.5. The average of the paired x-coordinates equals 2.5, confirming symmetry about that vertical line.

Check: Re-read the paired x-values and recompute the average; ensure the dashed line passes through x = 2.5.

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Original tasks 4 / complete keys

Task 4

A parabola has vertex (-3, 0). A horizontal line crosses it at x = -7 and x = 1. Find the axis and state one mistake to avoid when labeling it.

Answer: The axis is x = -3. Check: (-7 + 1) / 2 = -3. Avoid labeling the axis with the ordered pair (-3, 0); label it x = -3.

Reason: The vertex x-coordinate is -3, and the paired points average to -3. A vertical line is named by its x-value only.

Check: Verify the line is vertical, passes through the vertex, and carries the equation label x = -3 rather than a coordinate pair.

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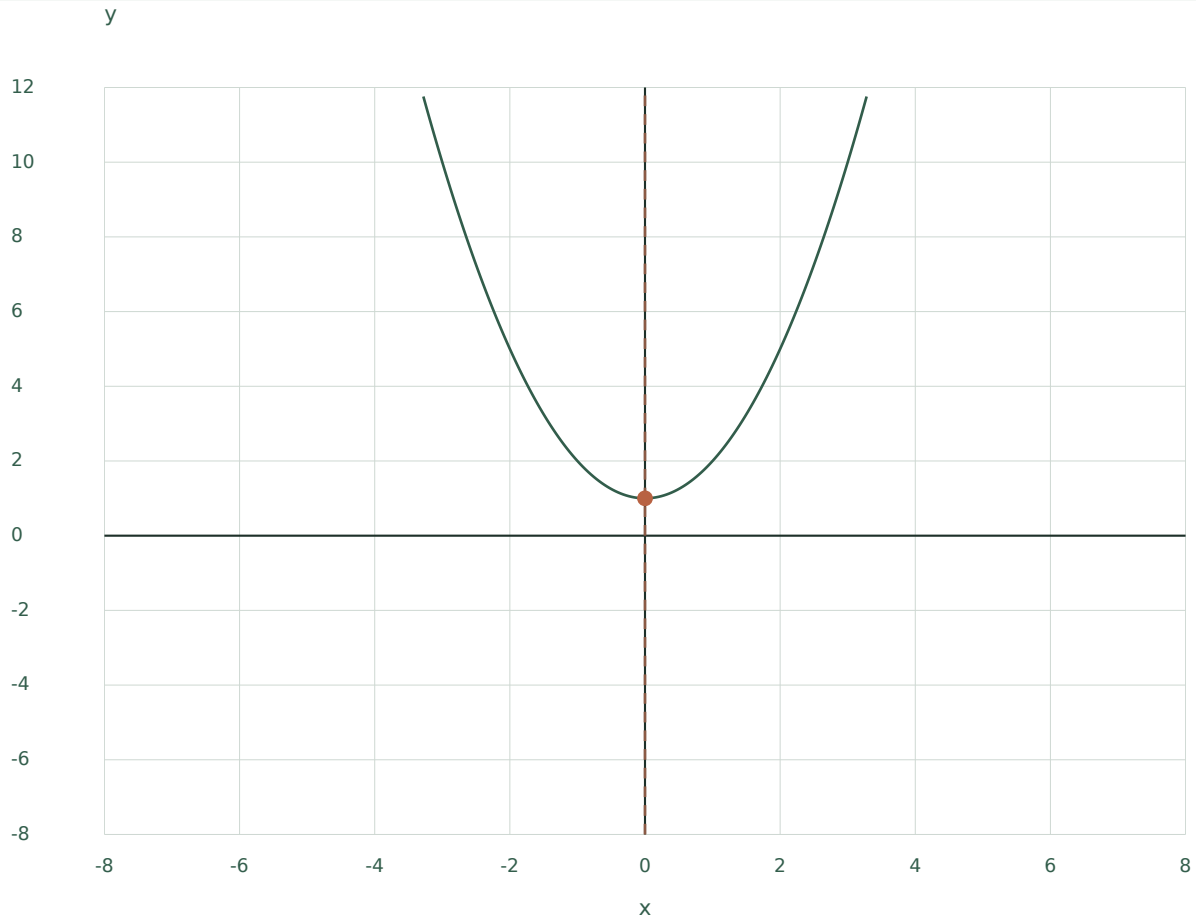
Task 1 / graph key



Chosen example curvature a=-1; the prompt fixes the vertex and symmetry, not a unique width. Dashed brown line is the axis in the answer.

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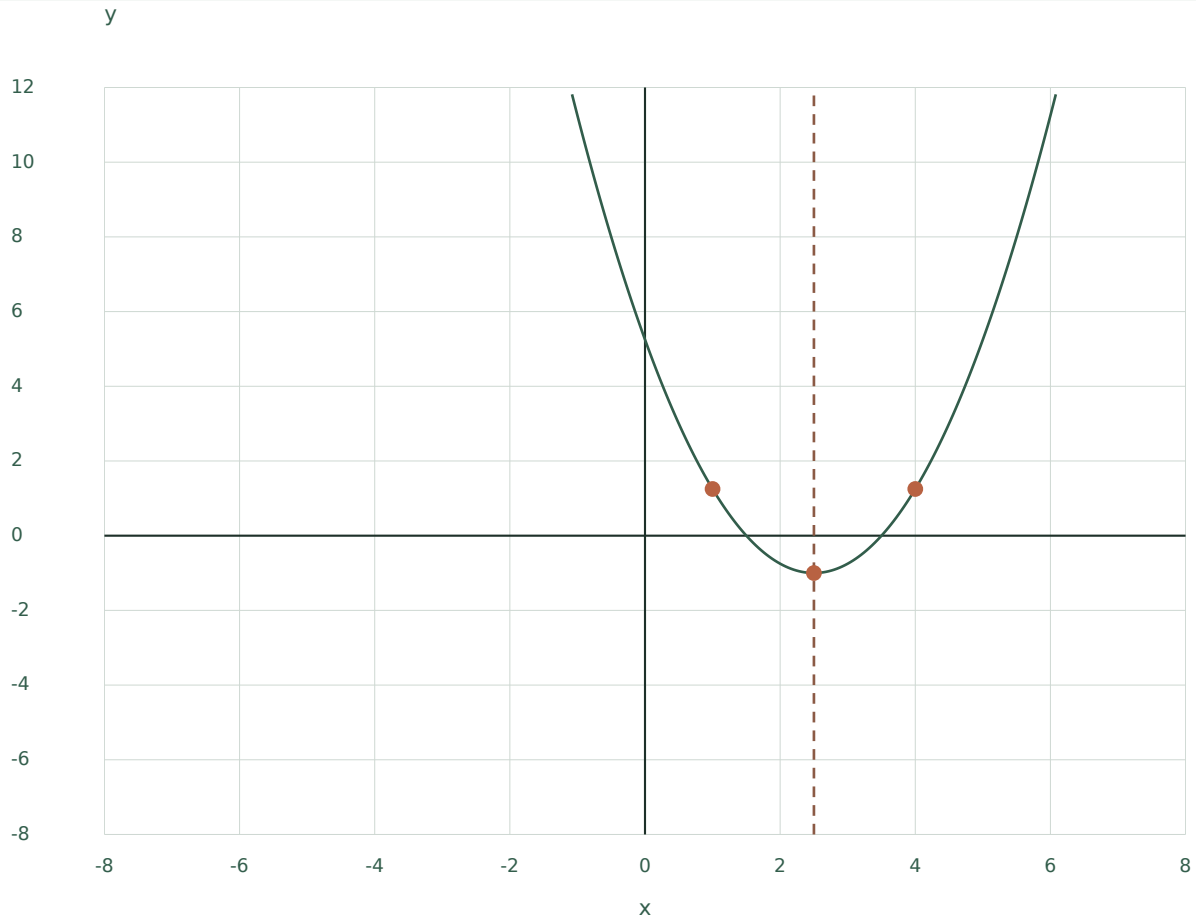
Task 2 / graph key



Chosen example curvature a=1; the prompt fixes the vertex and symmetry, not a unique width. Dashed brown line is the axis in the answer.

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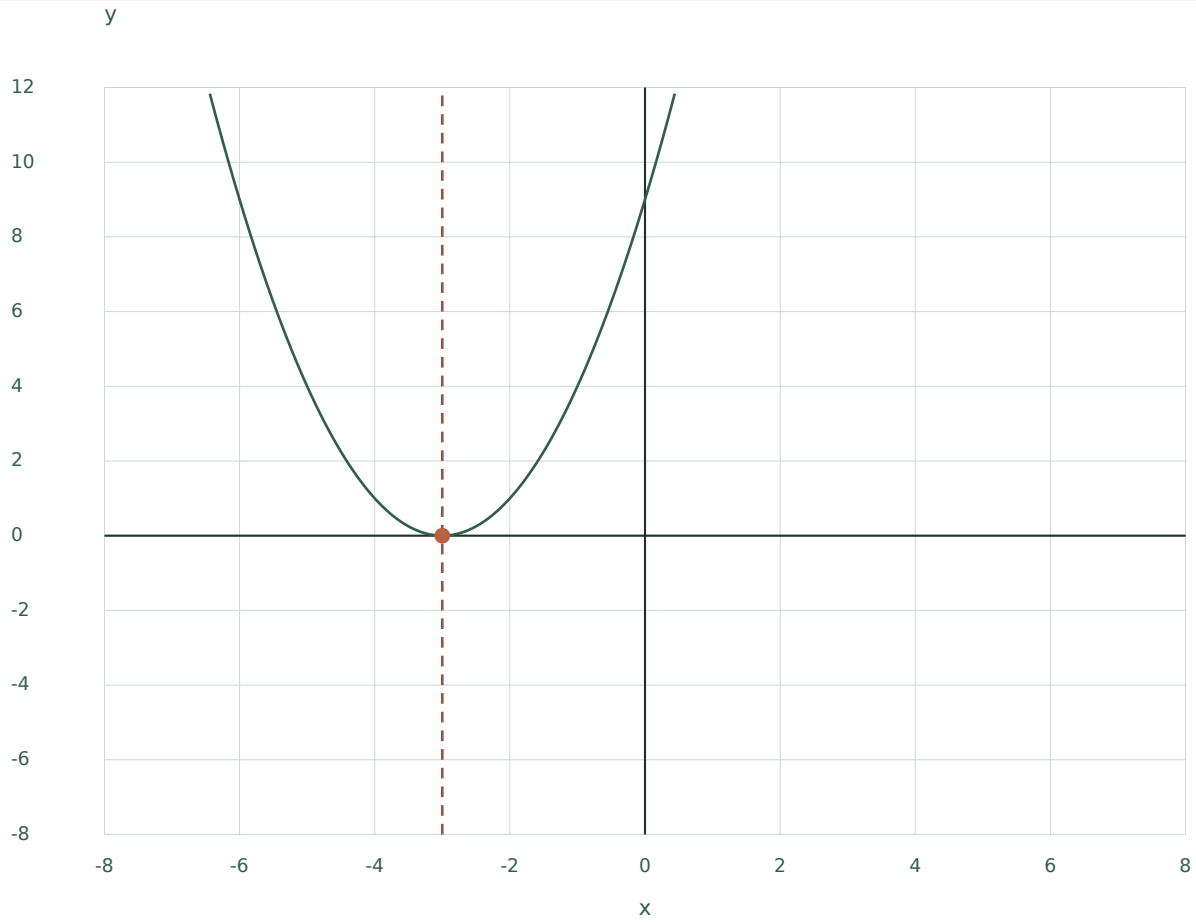
Task 3 / graph key



Chosen example curvature a=1; the prompt fixes the vertex and symmetry, not a unique width. Dashed brown line is the axis in the answer.

Draw a Parabola's Axis of Symmetry: Vertex, Vertical Line, and Check

Task 4 / graph key



Chosen example curvature a=1; the prompt fixes the vertex and symmetry, not a unique width. Dashed brown line is the axis in the answer.

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Source rubric / reflection

- [ ] Vertex is marked at the correct turning point and labeled with correct coordinates.
- [ ] The drawn line is vertical and passes through the vertex x-coordinate.
- [ ] The line is dashed and extends above and below the vertex when space allows.
- [ ] The axis is labeled with an equation of the form x = a number.
- [ ] A symmetry check using paired same-height points supports the axis value.
- [ ] Valid alternative handwriting or letter style is accepted if the mathematical content is correct.

Reflection: What did you check, what did you change, and what will you try next?