Graph Absolute-Value Inequalities: Boundary, Test Points, and Shading

Original tasks 1, 2, 3 / complete keys

Task 1

Graph |x| < 3. State the boundary lines, whether they are dashed or solid, and describe the shaded region.

Answer: Boundary lines: x = -3 and x = 3, both dashed. Shaded region: the vertical strip between x = -3 and x = 3, not including the boundary lines.

Reason: |x| < 3 rewrites as -3 < x < 3. The strict inequality means dashed boundaries. Test (0,0): |0| < 3 is true, so shade between the lines.

Check: Test a point inside the strip, such as (1,0): |1| < 3 is true. Test a point outside, such as (4,0): |4| < 3 is false. Confirm both boundary lines are dashed.

Task 2

Graph |y| ≥ 2. State the boundary lines, whether they are dashed or solid, and describe the shaded region.

Answer: Boundary lines: y = -2 and y = 2, both solid. Shaded region: above y = 2 and below y = -2, including the boundary lines.

Reason: |y| ≥ 2 rewrites as y ≤ -2 or y ≥ 2. The inclusive inequality means solid boundaries. Test (0,0): |0| ≥ 2 is false, so shade the two outer regions.

Check: Test (0,3): |3| ≥ 2 is true. Test (0,0): |0| ≥ 2 is false. Confirm both boundary lines are solid and both outer regions are shaded.

Task 3

Graph |x + 2| > 1. State the boundary lines, whether they are dashed or solid, and describe the shaded region.

Answer: Rewrite: x + 2 < -1 or x + 2 > 1, so x < -3 or x > -1. Boundary lines: x = -3 and x = -1, both dashed. Shaded region: to the left of x = -3 and to the right of x = -1.

Reason: The center is -2 and the radius is 1. The strict inequality gives dashed boundaries. Test (0,0): |0 + 2| = 2 > 1 is true, so shade the region containing (0,0), which is x > -1. Also shade x < -3 because the inequality is 'or'.

Check: Test (-4,0): |-4 + 2| = 2 > 1 is true. Test (-2,0): |-2 + 2| = 0 > 1 is false. Confirm both outer regions are shaded and both lines are dashed.

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Original tasks 4 / complete keys

Task 4

Graph $|y - 1| \leq 2$. State the boundary lines, whether they are dashed or solid, and describe the shaded region.

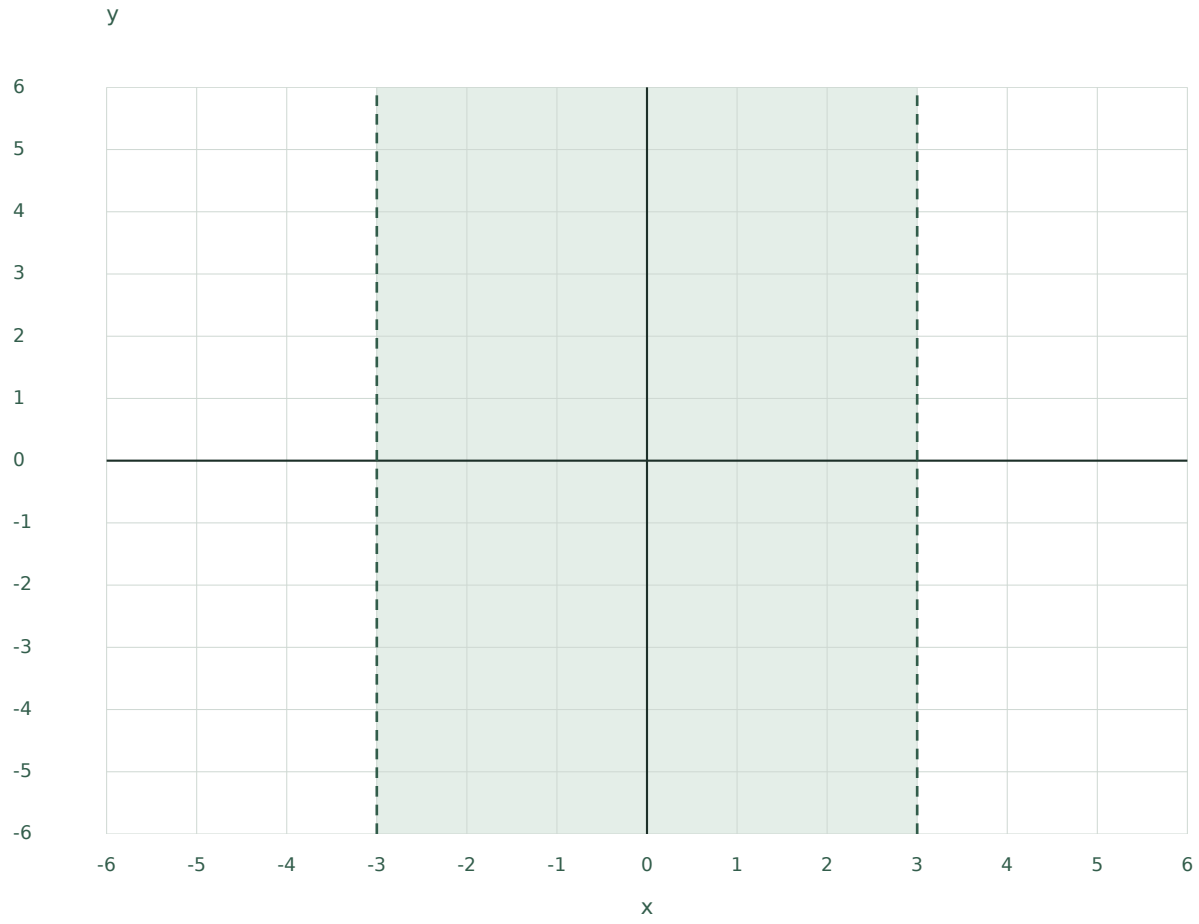
Answer: Rewrite: $-2 \leq y - 1 \leq 2$, so $-1 \leq y \leq 3$. Boundary lines: $y = -1$ and $y = 3$, both solid. Shaded region: the horizontal strip between $y = -1$ and $y = 3$, including the boundary lines.

Reason: The center is 1 and the radius is 2. The inclusive inequality gives solid boundaries. Test (0,0): $|0 - 1| = 1 \leq 2$ is true, so shade between the lines.

Check: Test (0,1): $|1 - 1| = 0 \leq 2$ is true. Test (0,4): $|4 - 1| = 3 \leq 2$ is false. Confirm both boundary lines are solid and the strip between them is shaded.

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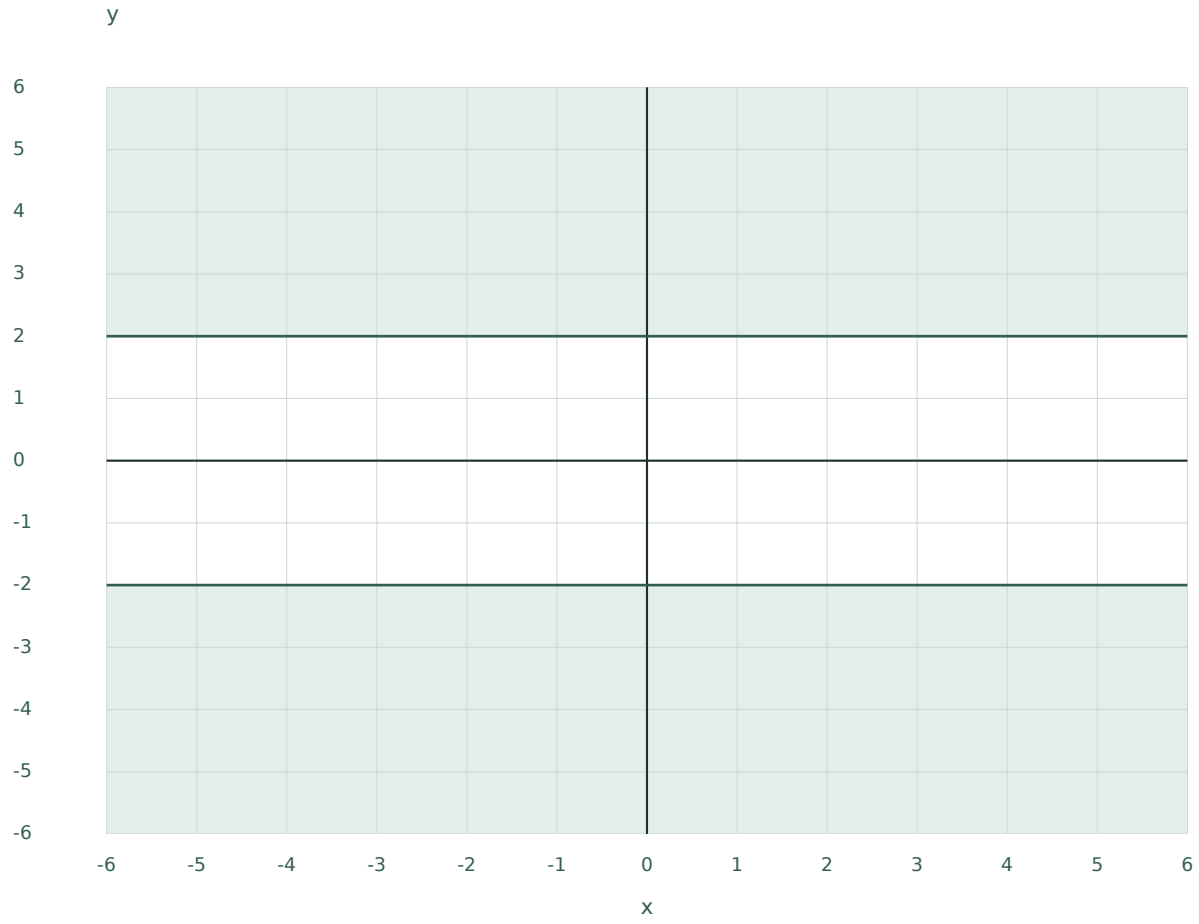
Task 1 / graph key



Shade the strip satisfying BOTH comparisons. Dashed boundaries exclude the edge.

Graph Absolute-Value Inequalities: Boundary, Test Points, and Shading

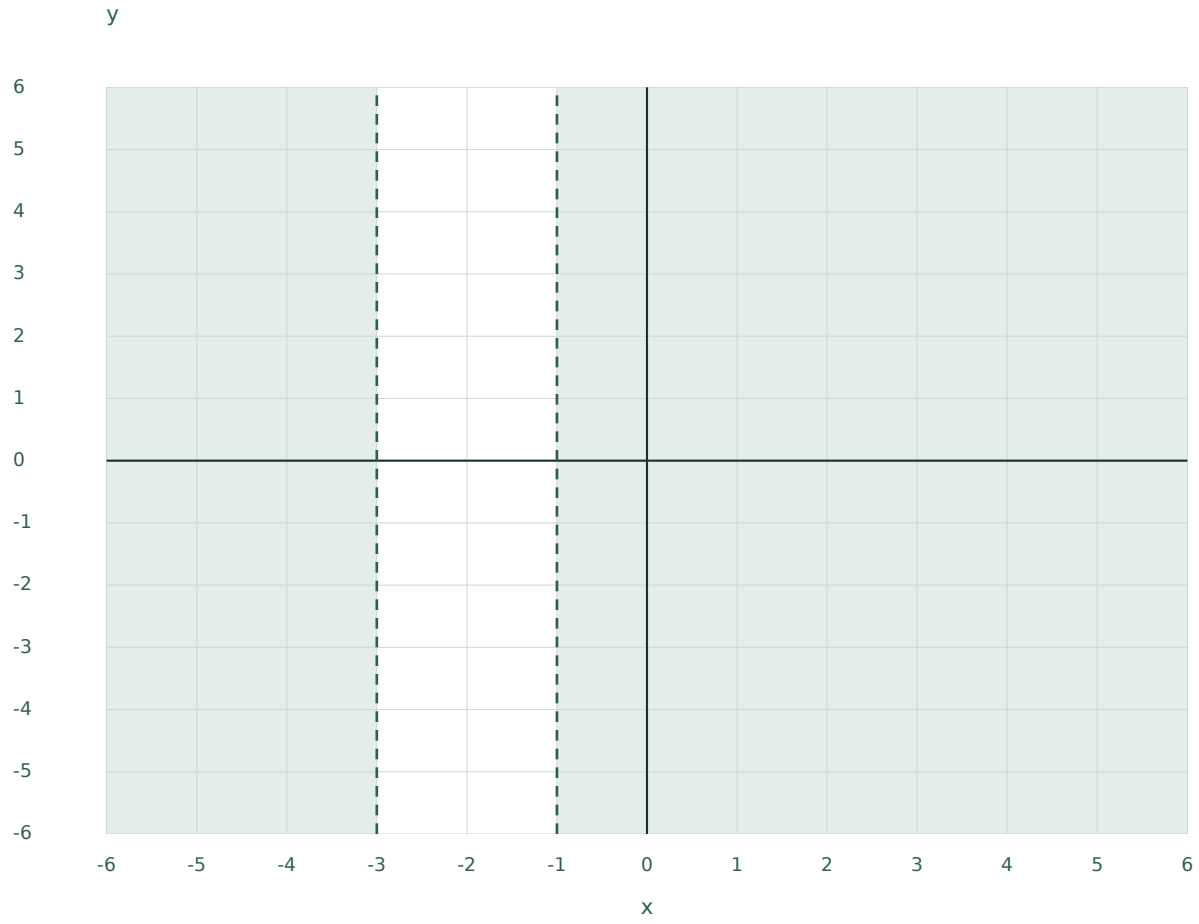
Task 2 / graph key



Two disjoint outer regions form a UNION, not their empty intersection. Solid boundaries include the edge.

Graph Absolute-Value Inequalities: Boundary, Test Points, and Shading

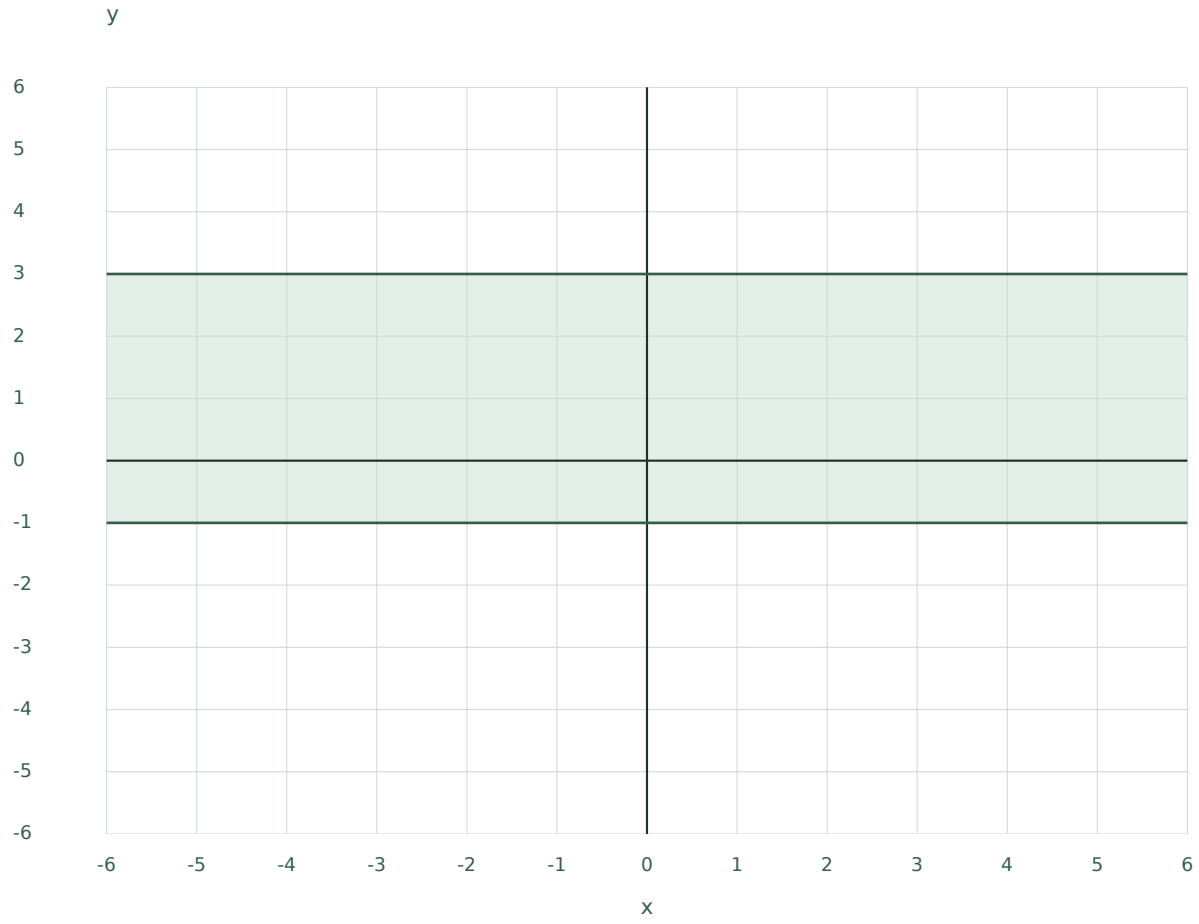
Task 3 / graph key



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Graph Absolute-Value Inequalities: Boundary, Test Points, and Shading

Task 4 / graph key



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Source rubric / reflection

- [ ] Rewrites the absolute-value inequality correctly as a compound inequality or two separate inequalities.
- [ ] Identifies both boundary values and draws them as vertical or horizontal lines.
- [ ] Uses dashed lines for strict inequalities and solid lines for inclusive inequalities.
- [ ] Selects a test point not on a boundary and substitutes correctly.
- [ ] Shades the region that makes the inequality true, including both outer regions for 'or' inequalities.
- [ ] Labels boundary lines and indicates the shaded region clearly.
- [ ] Accepts valid alternative test points and equivalent shading descriptions, provided the region is correct.

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