Spotting Inconsistent Systems by Graphing Parallel Lines

Original worked example / unchanged complete key

Prompt: Graph the system y = 3x + 2 and y = 3x - 4. Determine whether the system is inconsistent and explain why.

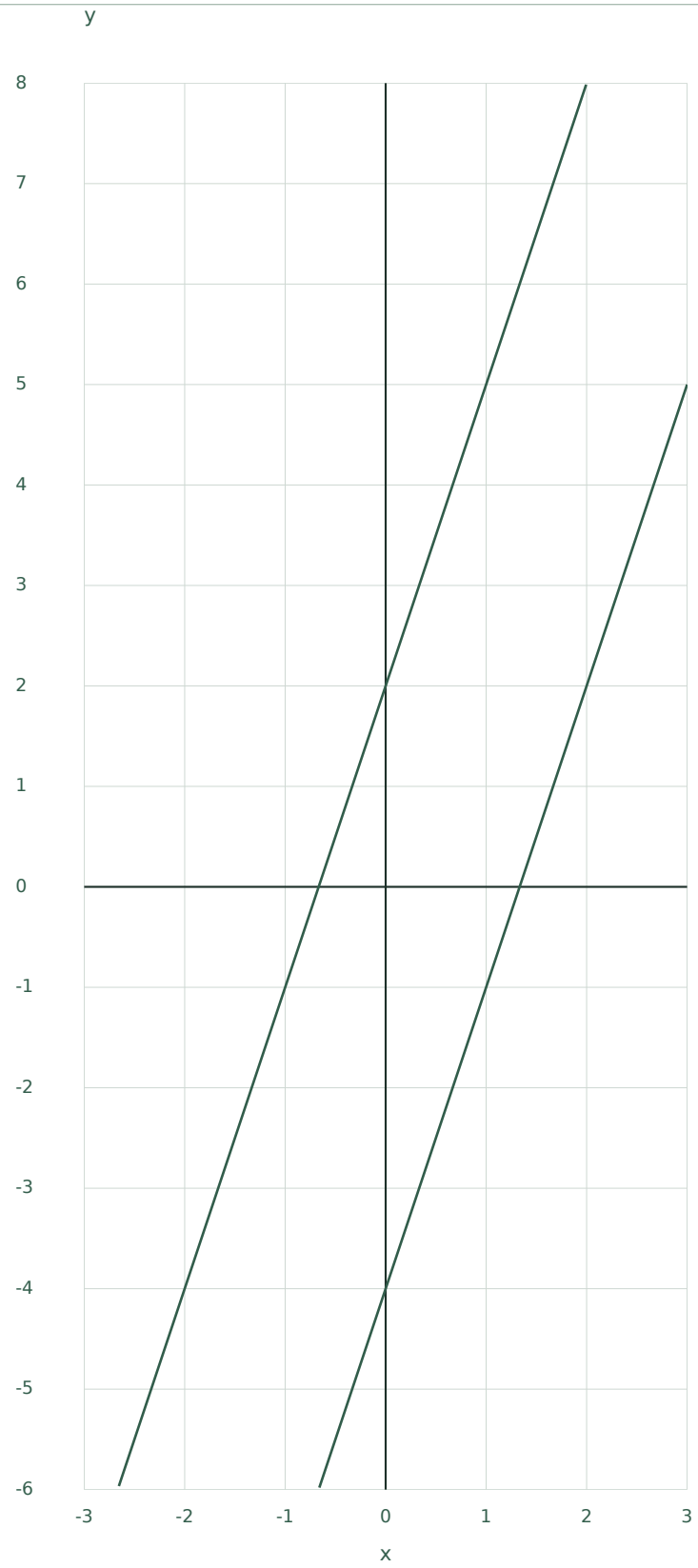
Answer: Both equations have slope 3. The y-intercepts are 2 and -4, which are different. The lines are parallel and distinct, so they never intersect. The system is inconsistent and has no solution.

Reason: Plot (0, 2) and (1, 5) for the first line; plot (0, -4) and (1, -1) for the second. The vertical gap at x = 0 is 2 - (-4) = 6, and at x = 1 it is 5 - (-1) = 6. The constant gap confirms parallel lines. Equal slopes with different intercepts mean no intersection point exists.

Check: Substitute x = 0 into both equations: y = 2 and y = -4, which differ. Substitute x = 1: y = 5 and y = -1, which differ. The gap stays 6, so no x-value makes the y-values equal.

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Worked example: y = 3x + 2 and y = 3x - 4



Worked reference graph showing the two parallel lines with constant vertical gap 6.