Writing Equations of Parallel and Perpendicular Lines

Lesson Objective

Using Slope-Intercept Form

Step 1: Find the slope (m) of the parallel (or perpendicular) line
Step 2: Find the y-intercept (b) by using (m) from Step 1, and the given point (x, y)
Step 3: Write the equation of the line using the slope (m) and y-intercept (b) from Steps 1 and 2.
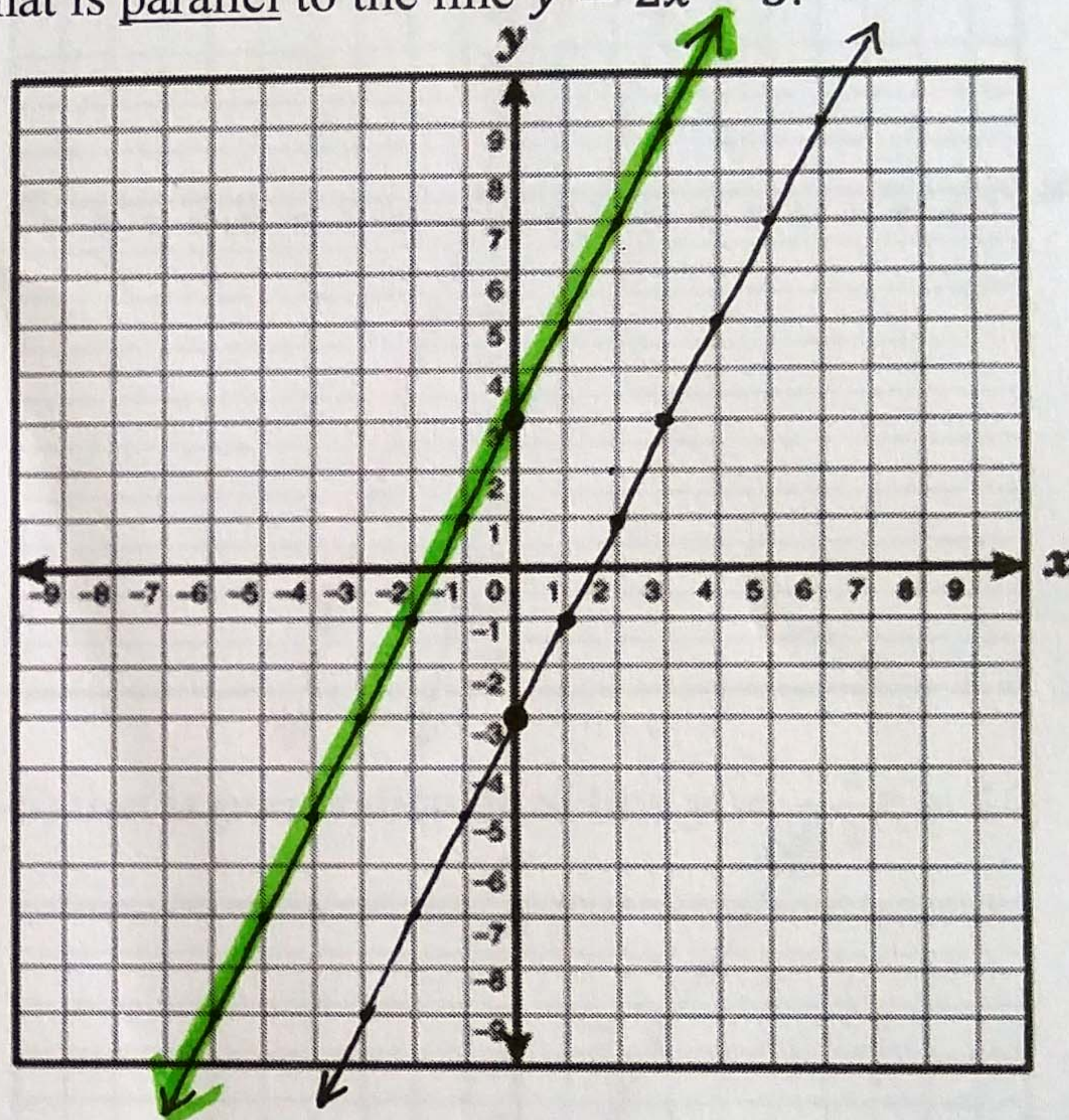
Examples:

1. Write an equation of the line passing through point (-1, 1) that is <u>parallel</u> to the line $y = 2x - 3$.

① $m = 2$

② $1 = 2(-1) + b$
$1 = -2 + b$
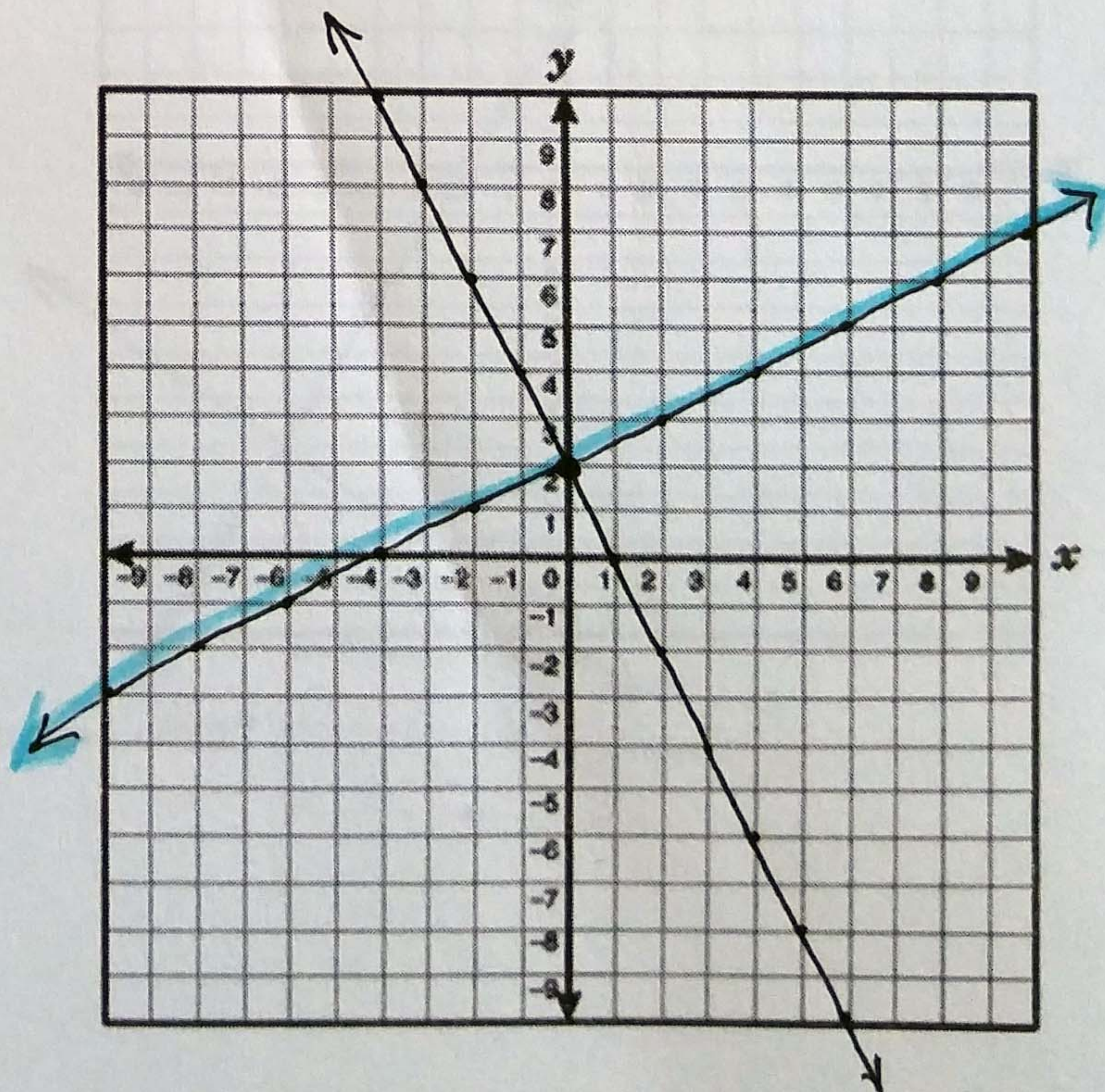$\underline{+2 \quad +2}$
$3 = b$

③ $y = 2x + 3$

2. Write an equation of the line passing through (2, 3) that is <u>perpendicular</u> to the line $2x + y = 2 \rightarrow y = -2x + 2$

① $\perp$ to $m = -2$
$m = \frac{1}{2}$

② $3 = \frac{1}{2}(2) + b$
$3 = 1 + b$
$\underline{-1 \quad -1}$
$2 = b$

③ $y = \frac{1}{2}x + 2$

Step 1: Find the slope (m) of the parallel (or perpendicular) line
Step 2: Plug in the slope (m) from above and the given point (x, y) to the point-slope form equation of a line.
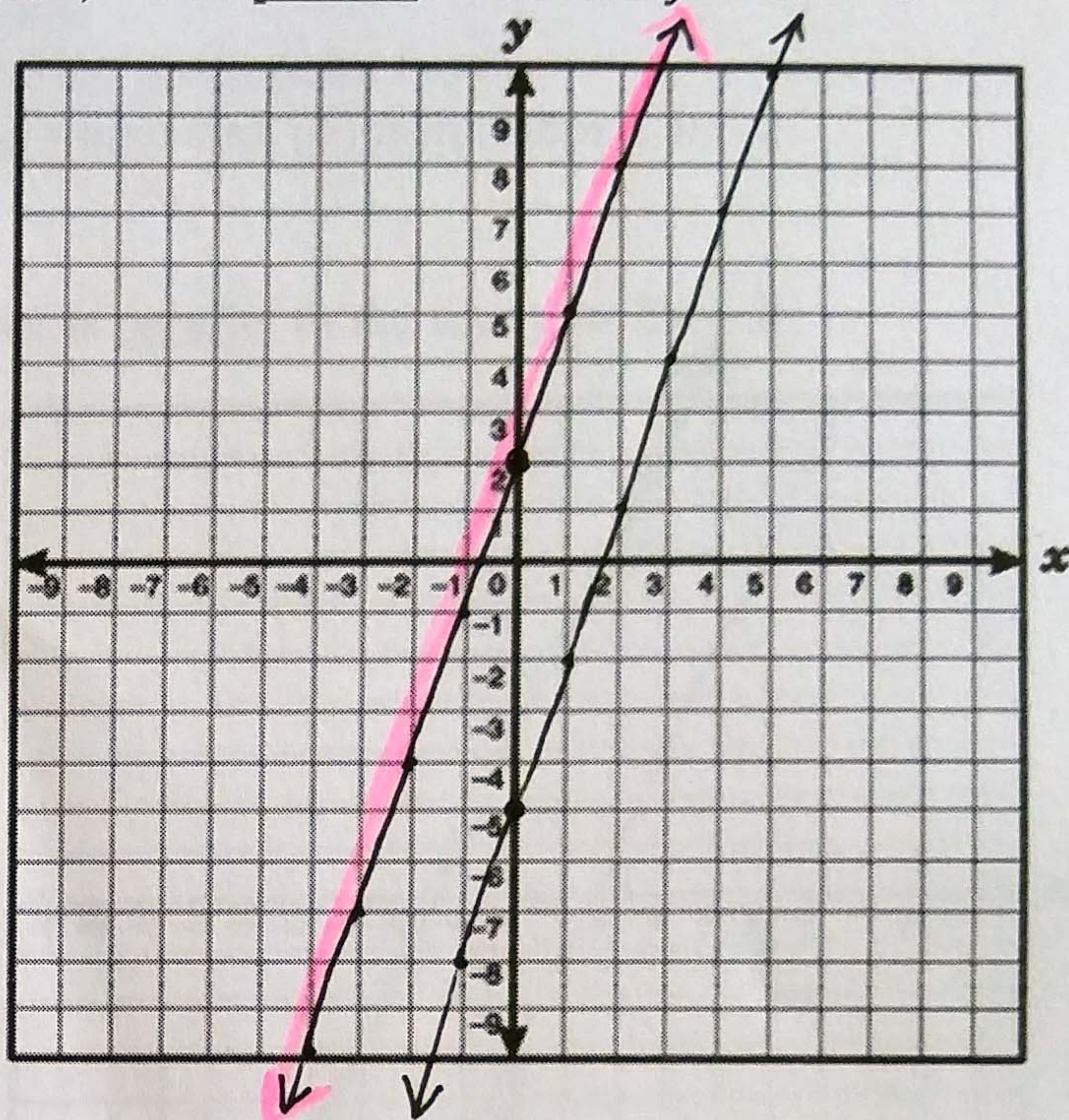**Step 3**: Solve for y to get the equation into slope-intercept form.

Examples:

3. Write an equation of the line that passes through the point (1, 5) and is <u>parallel</u> to the line $y = 3x - 5$

① $m = 3$

② $y - 5 = 3(x - 1)$

③ $y - 5 = 3x - 3$
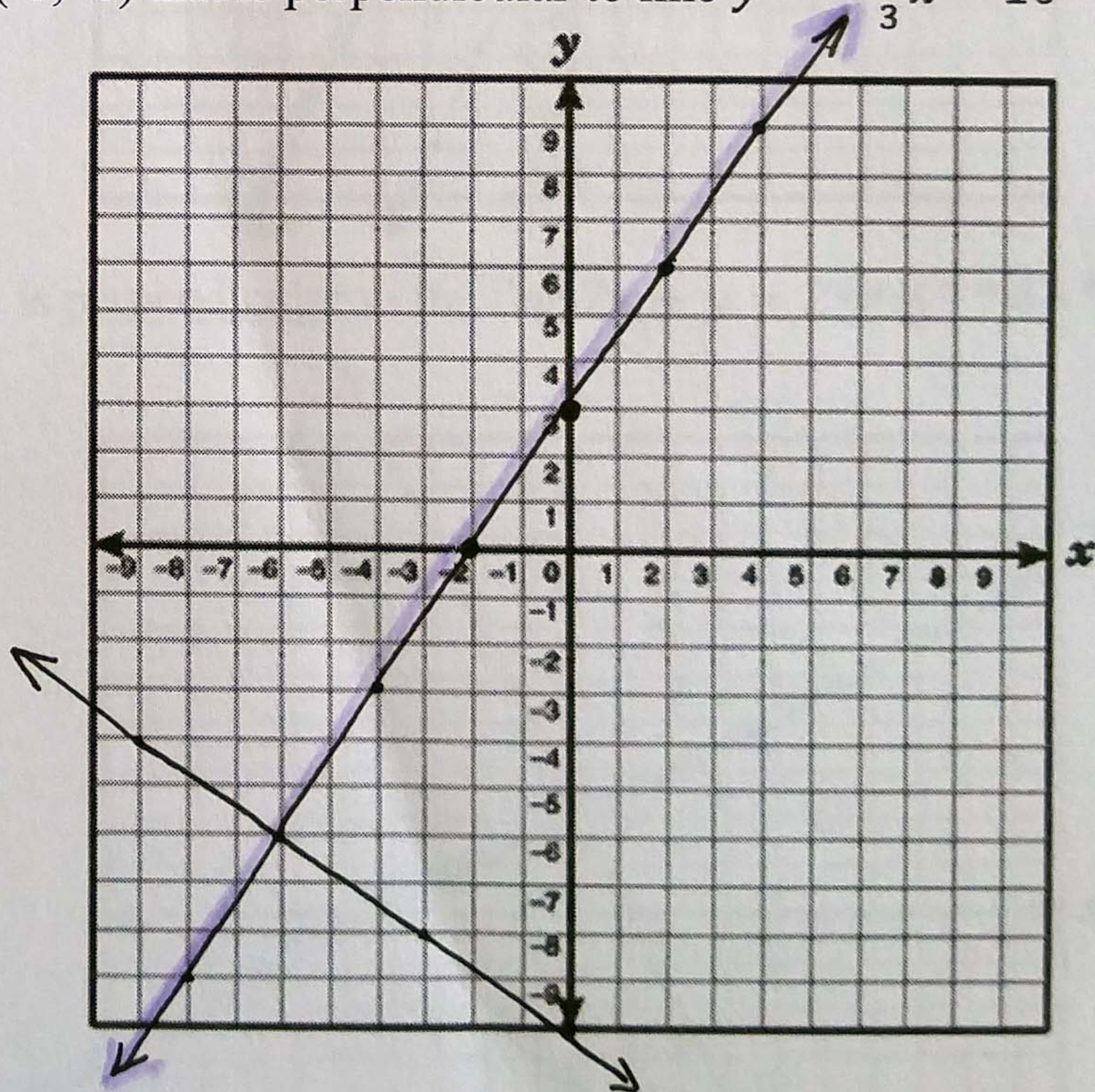$ +5 + 5$
$\overline{ y = 3x + 2}$

4. Write an equation of the line passing through the point (-6, -6) that is perpendicular to line $y = -\frac{2}{3}x - 10$

① $\perp$ to $m = -\frac{2}{3}$

$m = \frac{3}{2}$

② $y - (-6) = \frac{3}{2}(x - (-6))$

③ $y + 6 = \frac{3}{2}x + 9$
$ -6 \phantom{= \frac{3}{2}x} -6$
$\overline{ y = \frac{3}{2}x + 3}$

How do you know that the line $x = 4$ and $y = 2$ are perpendicular?

SKIP