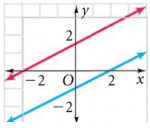
Ch 6.6 Parallel and Perpendicular lines

In the graph at the right, the red and blue lines are parallel.
Parallel lines are lines in the same plane that never intersect. The equation of the red line is $y = \frac{1}{2}x + \frac{3}{2}$.
The equation of the blue line is $y = \frac{1}{2}x - 1$.



Property — **Slopes of Parallel Lines**

Nonvertical lines are parallel if they have the same slope and different *y*-intercepts. *Any* two vertical lines are parallel.

Example The equations $y = \frac{2}{3}x + 1$ and $y = \frac{2}{3}x - 3$ have the same slope, $\frac{2}{3}$, and different *y*-intercepts. The graphs of the two equations are parallel.

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1 EXAMPLE **Determining Whether Lines Are Parallel**

Are the graphs of $y = -\frac{1}{3}x + 5$ and $2x + 6y = 12$ parallel? Explain.

Write $2x + 6y = 12$ in slope-intercept form. Then compare with $y = -\frac{1}{3}x + 5$.

Ex1b) 2x + y = -1 and 4x + 2y = -6

Try

1. Are the graphs of $-6x + 8y = -24$ and $y = \frac{3}{4}x - 7$ parallel? Explain.

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2 EXAMPLE **Writing Equations of Parallel Lines**

Write an equation for the line that contains (5, 1) and is parallel to $y = \frac{3}{5}x - 4$.

2. Write an equation for the line that contains (2, −6) and is parallel to $y = 3x + 9$.

Try #2. (-2,3) $y = \frac{5}{2}x - 4$

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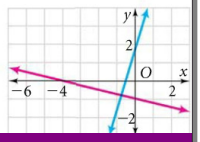
The lines at the right are perpendicular.
Perpendicular lines are lines that intersect to form right angles. The equation of the red line is $y = -\frac{1}{4}x - 1$. The equation of the blue line is $y = 4x + 2$.



Property — **Slopes of Perpendicular Lines**

Two lines are perpendicular if the product of their slopes is −1. A vertical and a horizontal line are also perpendicular.

Example The slope of $y = -\frac{1}{4}x - 1$ is $-\frac{1}{4}$. The slope of $y = 4x + 2$ is 4. Since $-\frac{1}{4} \cdot 4 = -1$, the graphs of the two equations are perpendicular.

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Determine the slope of the a line and then what is the perpendicular slope.

Ex3a) 2x - 7y = 14

Ex3b) 3y = -x - 5

Ex3c) 5x - 2 = 13

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Ex4a) y = ¾x − 12, (3, −2)

Ex2b) y = - x + 4, (-4, 6)

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Try #3. $y = 3x - 2$, $(3, -1)$

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