Slopes of Parallel and Perpendicular Lines

Today I Can

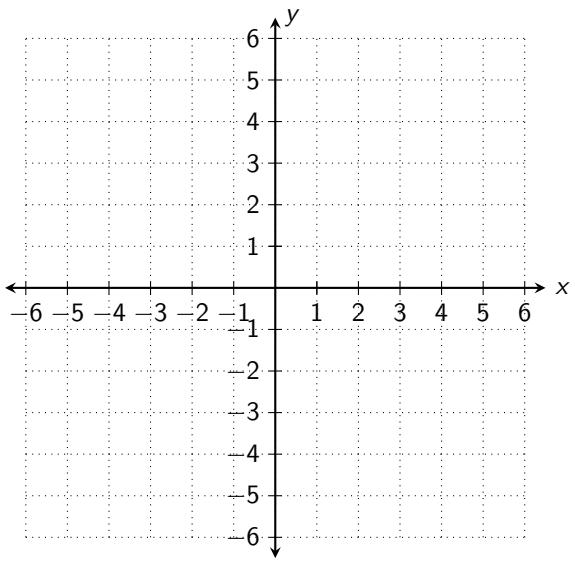
1. Relate slope to parallel and perpendicular lines.

Slopes of Parallel Lines

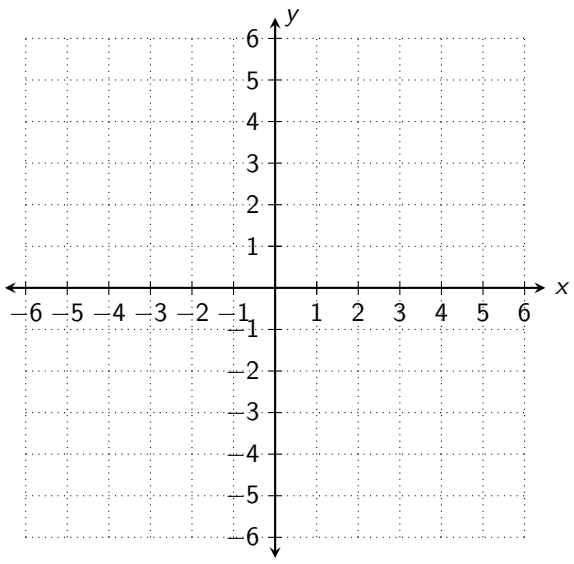
- If 2 non-vertical lines are parallel, then their slopes are equal (and vice versa).
- Any 2 vertical lines are parallel.
- Any 2 horizontal lines are parallel.

Example 1. Determine if $a \parallel b$. Justify your answer.

(a) Line a: $(-3, 3)$ and $(-1, -4)$
Line b: $(-1, 5)$ and $(2, -4)$



(b) Line a: $(0, 1)$ and $(5, -2)$
Line b: $(0, 4)$ and $(5, 1)$



Example 2.

(a) What is the equation of the line parallel to $y = -3x - 5$ that contains $(-1, 8)$?

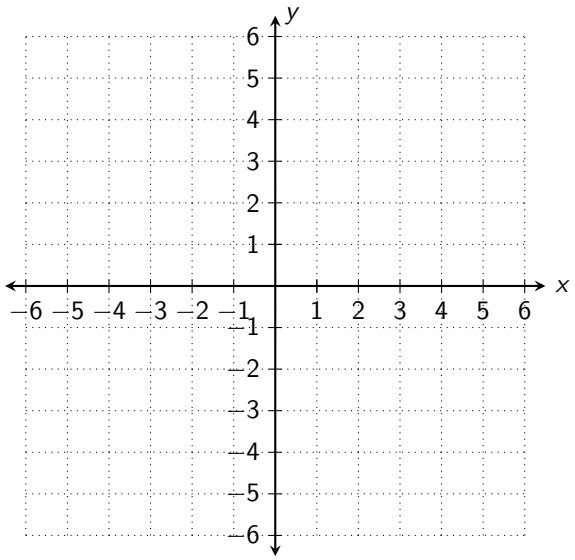
(b) What is the equation of the line parallel to $y = -x - 7$ that contains $(-5, 3)$?

Slopes of Perpendicular Lines

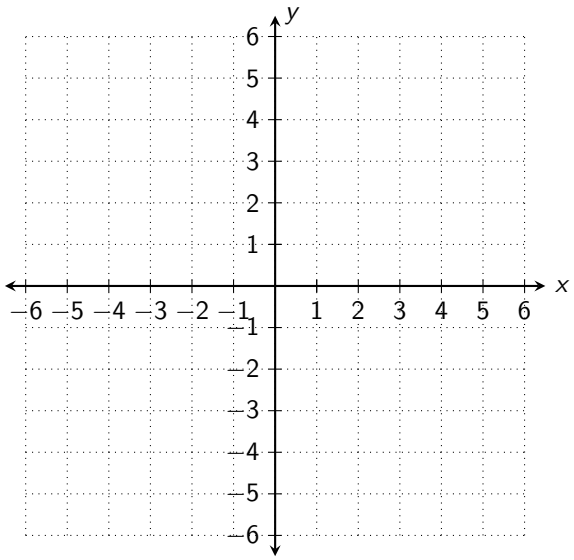
- Opposite signs
- Reciprocals
- One line is horizontal and the other is vertical

Example 3. Determine whether or not the lines are perpendicular. Justify your answer.

(a) Line a: $(-4, 2)$ and $(0, -4)$
Line b: $(-5, -3)$ and $(4, 3)$



(b) Line a: $(1, 5)$ and $(-3, -3)$
Line b: $(4, 5)$ and $(-2, 2)$



Example 4.

(a) What is the equation of the line perpendicular to $y = \frac{1}{5}x + 2$ that contains $(15, -4)$?

(b) What is the equation of the line perpendicular to $y = -3x - 5$ that contains $(-3, 7)$?