

Lesson 3.3: Parallel and Perpendicular Lines

By the end of the lesson, we will be able to:

- ~ Define Parallel lines.
- ~ Find equations of Parallel lines.
- ~ Define Perpendicular lines.
- ~ Find equations of Perpendicular lines.

Quick Reminder!

Slope-Intercept Form:

$$y = mx + b$$

Point-Slope Form:

$$y - y_1 = m(x - x_1)$$

Definition

Parallel lines are lines that have exactly the same slope – but different y -intercepts.

Note: Vertical lines are parallel only if the x -intercepts are different.

Note: If two lines have the same slope and the same y -intercept, then they are the SAME line.

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Determine whether the given lines are parallel.

a.) $4x + y = 8$
 $6x + 2y = 12$

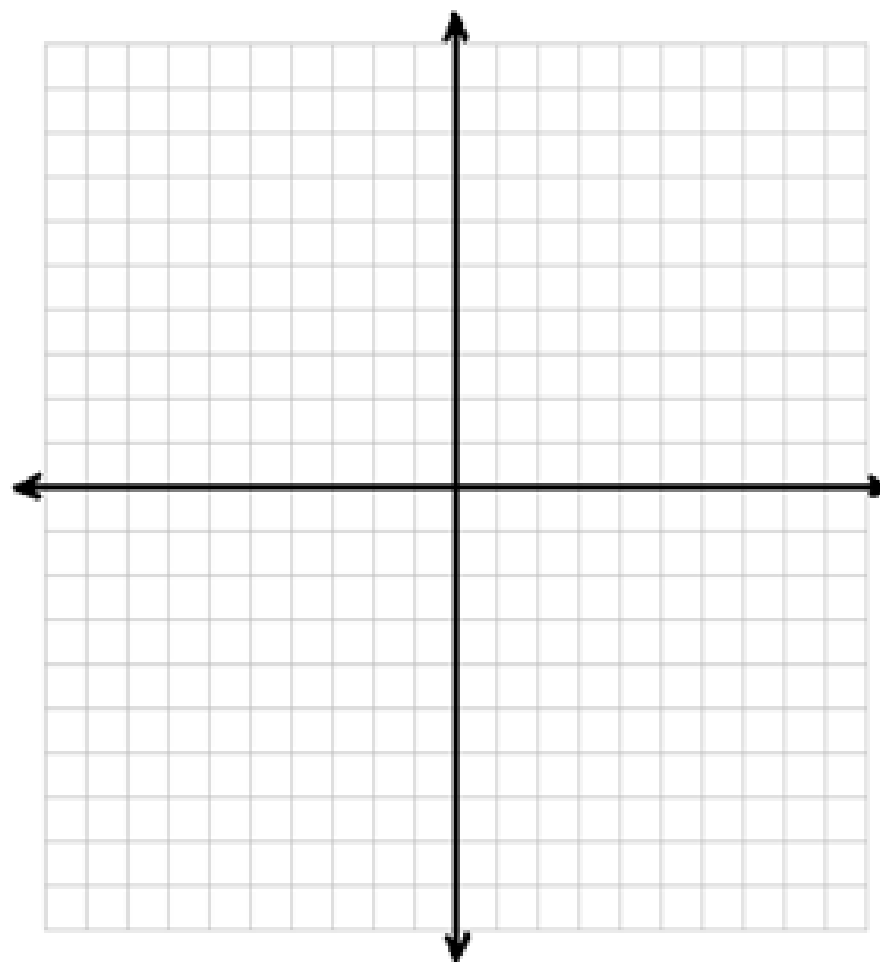
b.) $-3x + 2y = 6$
 $6x - 4y = 8$

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Example 1:

Find the equation of the line that is parallel to $4x + 2y = 2$ and goes through $(-2, 3)$. Graph.

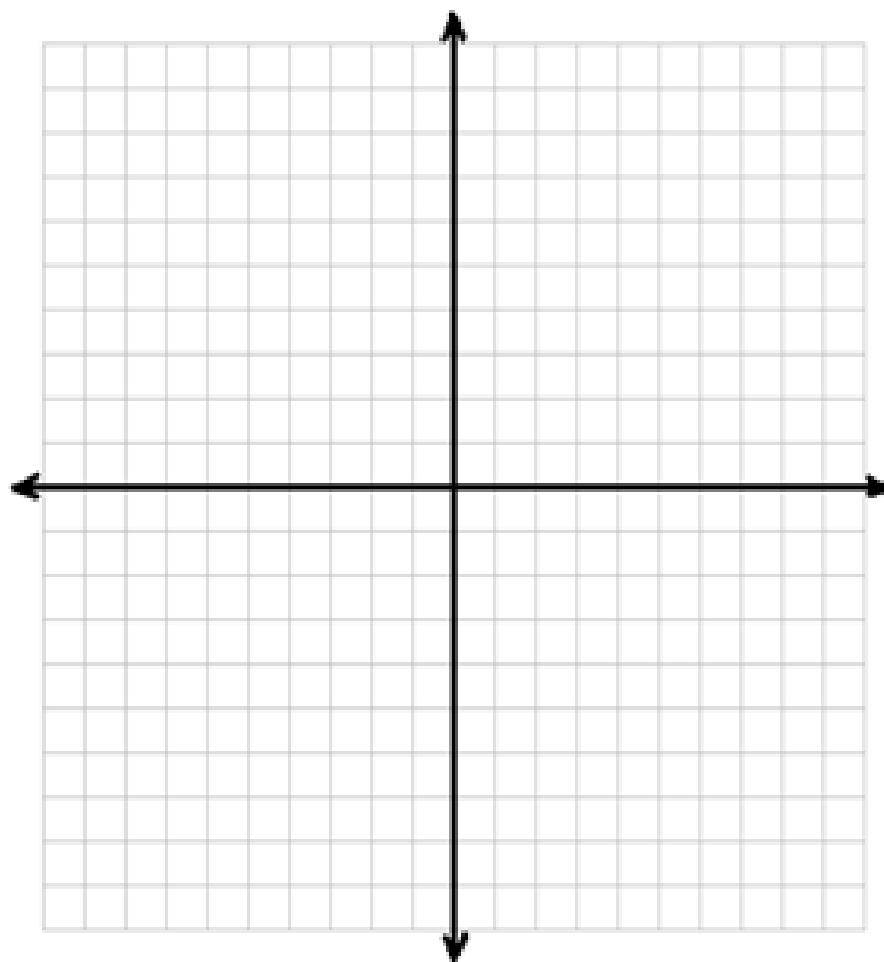
Hint: Remember Point-Slope Form.



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Example 2:

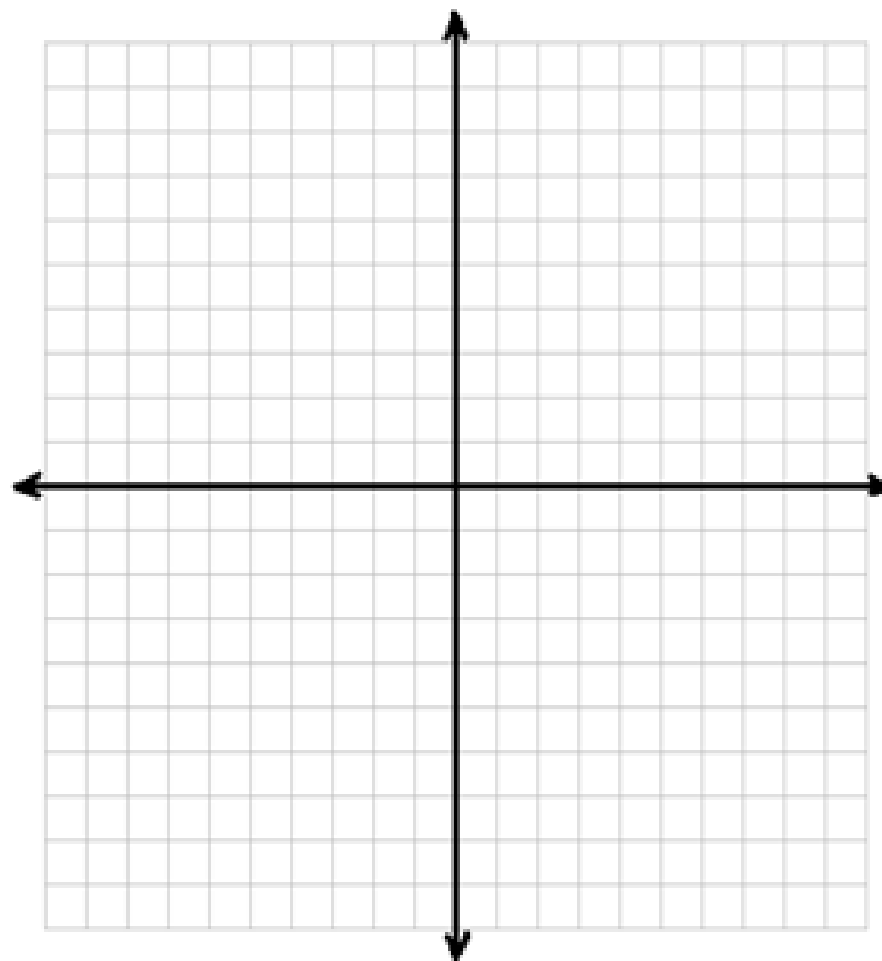
Find the equation of the line that is parallel to $y = 3x + 1$ and goes through $(5, 8)$. Graph both lines.



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Example 3:

Write the equation of the line parallel to $x=5$, and passing through the point $(3, -4)$. Graph both lines.



Definition

Perpendicular lines: Lines are perpendicular if and only if the product of their slopes is -1 . (Which means if the slopes are negative reciprocals of one another, then the lines are perpendicular.)

Note: Any vertical line is perpendicular to a horizontal line.

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Example 4:

Find the slope of the line perpendicular to a line whose slope is -3 .

Example 5:

Find the slope of the line perpendicular to a line whose slope is $4/5$.

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Example 6:

Determine whether the given lines are perpendicular.

a.) $y = 4x + 1$
 $y = -4x - 3$

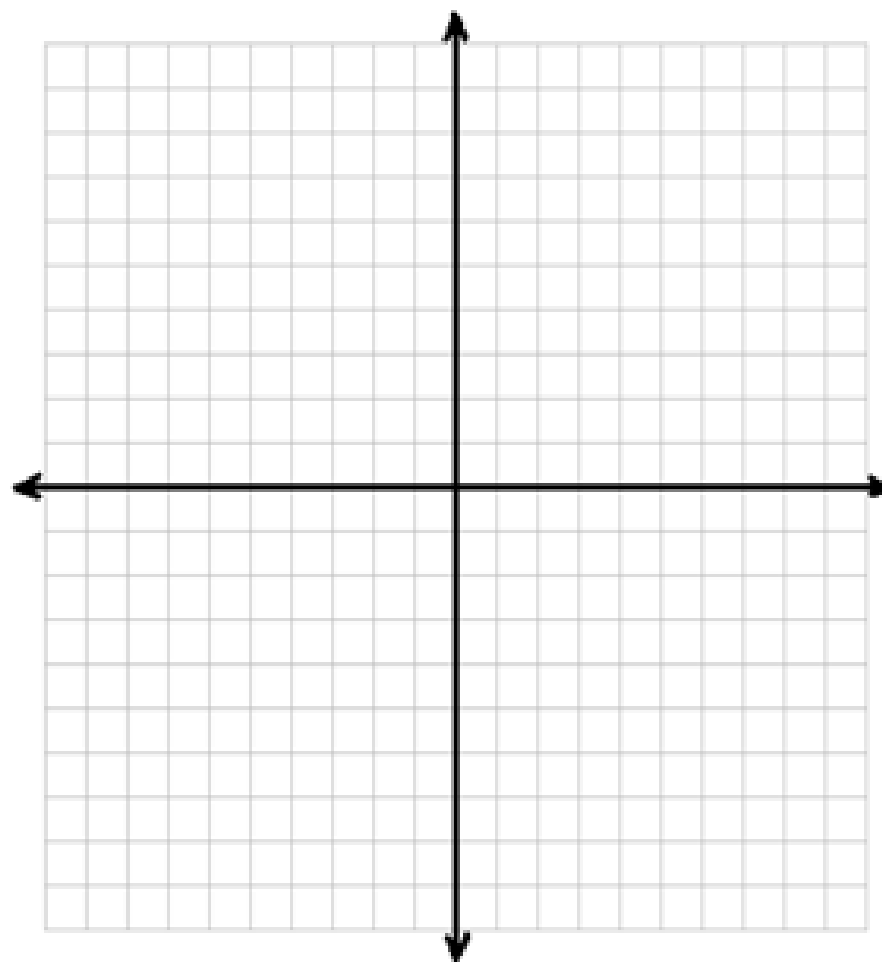
b.) $y = (2/3)x - 5$
 $y = (-3/2)x + 2$

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Example 7:

Find the equation of the line that is Perpendicular to $2x + 5y = 10$ and goes through $(4, -1)$. Graph both lines.

Hint: Remember Point-Slope Form.

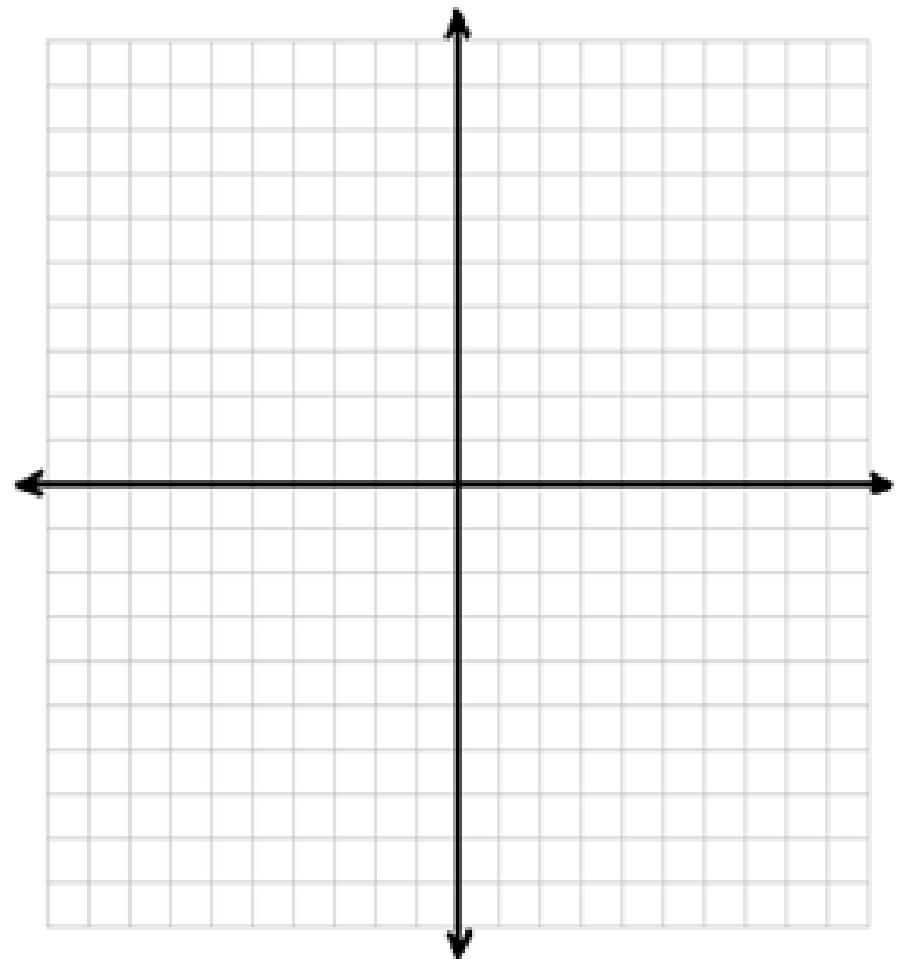


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Example 8:

Find the equation of the line that is Perpendicular to $y = 2x + 1$ and goes through $(-4, 2)$. Graph both lines.

Hint: Remember Point-Slope Form.

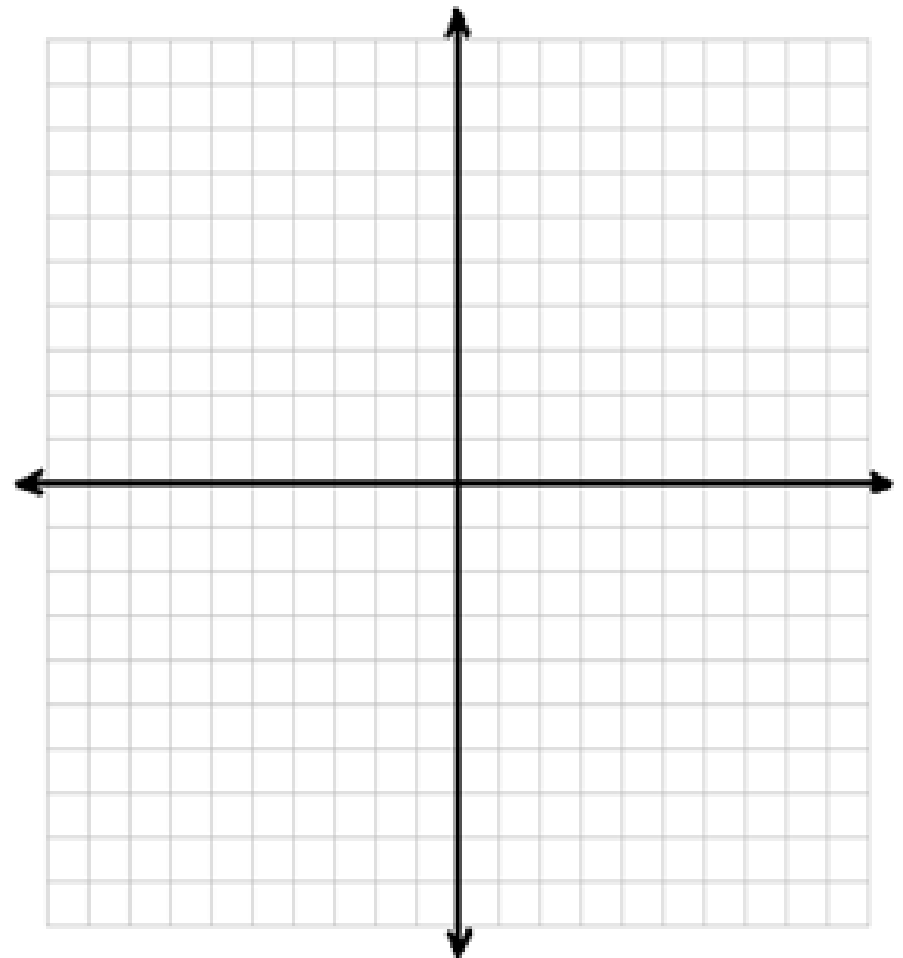


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Example 9:

Find the equation of the line that is Perpendicular to $3x = 4y = 8$ and goes through $(-3, -4)$. Graph both lines.

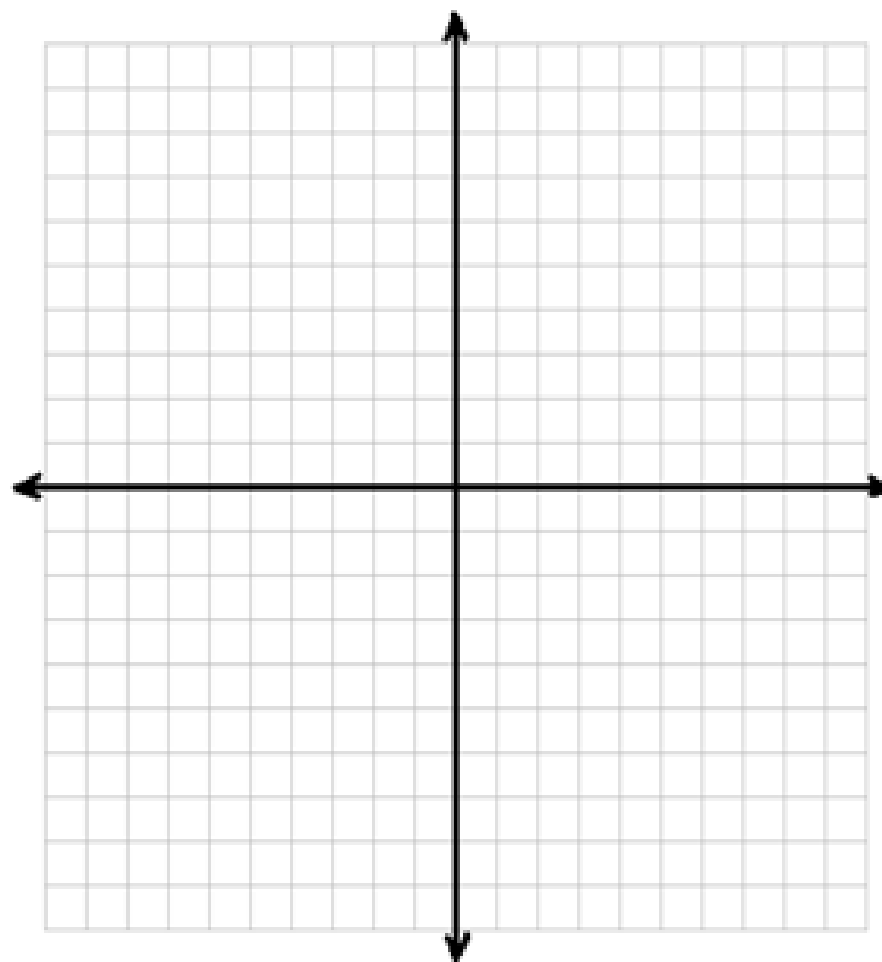
Hint: Remember Point-Slope Form.



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Example 10:

Write the equation of the line Perpendicular to $x=5$, and passing through the point $(3, -4)$. Graph both lines.



Homework:

Pg. 220: 1-5 all, 11, 15, 21, 25,
27, 29, 31-37 odds, 47

&

QUIZ Pg. 223: 1-16 all