

Your Name

Mrs. T

12/8/2020

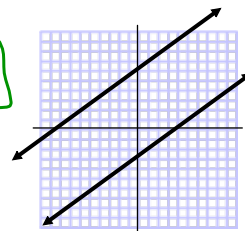
Notes

Lesson 4.3

Parallel and Perpendicular Lines

Parallel
Lines

Lines that never intersect

Lines that have the same slope
but different y-interceptsWhere does the
slope come from?

A line that would be parallel to

$$y = x + 5 \quad \text{is:} \quad y = 1x - 3$$

$$m = 1 \quad m_{//} = 1$$

$$y = -4x - 3 \quad \text{is:} \quad y = -4x + 2$$

$$m = -4 \quad m_{//} = -4$$

$$y = -\frac{3}{4}x + 2 \quad \text{is:} \quad y = -\frac{3}{4}x + 0$$

$$m = -\frac{3}{4} \quad m_{//} = -\frac{3}{4}$$

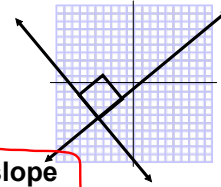
Perpendicular Lines

How do we make it a right angle?

Lines that intersect at a right angle

Lines that have the

negative reciprocal slope



Negative Reciprocal??! - flip and make negative

$$m = \frac{1}{1} \quad m_{\perp} = -\frac{1}{1}$$

$$m = -\frac{2}{3} \quad m_{\perp} = +\frac{3}{2}$$

A line that would be perpendicular to

$y = x + 5$ is: $y = -x + 1$

$m = 1 \quad m_{\perp} = -1$

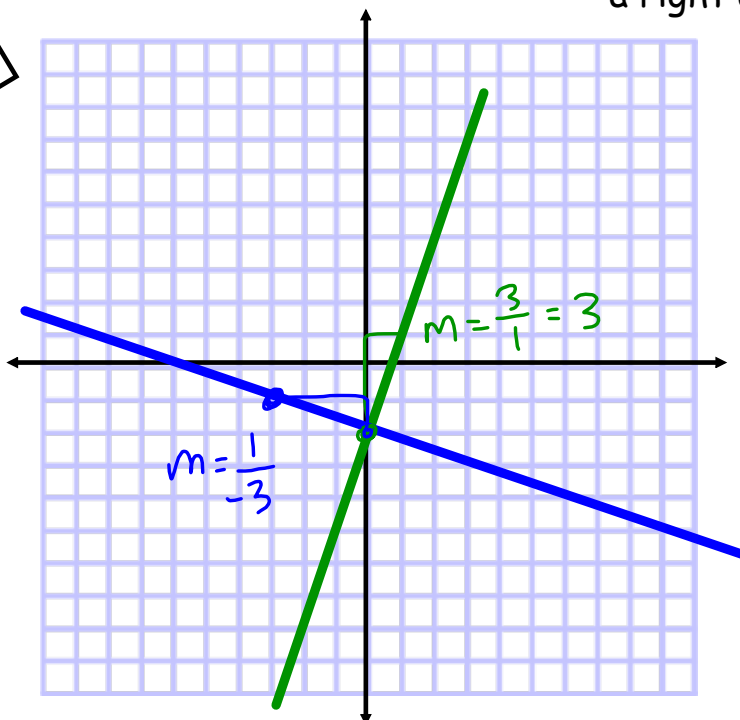
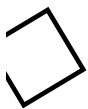
$y = -4x - 3$ is: $y = \frac{1}{4}x$

$m = -4 \quad m_{\perp} = \frac{1}{4}$

$y = -\frac{3}{4}x + 2$ is: $y = \frac{4}{3}x - 1$

$m = -\frac{3}{4} \quad m_{\perp} = \frac{4}{3}$

Let's Think about it! What lines can we draw that we know make a right angle?



$y = \frac{2}{3}x + 1$

$y = -\frac{3}{2}x + 4$

$y = -\frac{1}{3}x - 2$

$y = 3x - 2$

Given a Point and an Equation Parallel

$$y = mx + b$$

Write the equation for a line that passes through (1, -4) and is parallel to $y = -3x - 7$

$m = -3$ $m_{//} = -3$
Same slope
 $y = mx + b$
 $-4 = -3(1) + b$
 $-4 = -3 + b$
 $+3 \quad +3$
 $-1 = b$
 $y = -3x - 1$
will pass through (1, -4) + be parallel to $y = -3x - 7$

Write the equation for the line that passes through (-5, 6) and is parallel to $y = -4/3x + 1$

$m = -\frac{4}{3}$ $m_{//} = -\frac{4}{3}$
 $y = mx + b$
 $6 = -\frac{4}{3}(-5) + b$
 $6 = -1.\bar{3}(-5) + b$
 $6 = 6.\bar{6} + b$
 $-6.\bar{6} \quad -6.\bar{6}$
 $-0.\bar{6} = b$
 $y = -\frac{4}{3}x - 0.\bar{6}$
need the letters y and x in an equation

Given a Point and an Equation Perpendicular

$$y = mx + b$$

Write the equation for the line that passes through (1, -4) and is perpendicular to $y = -3x - 7$

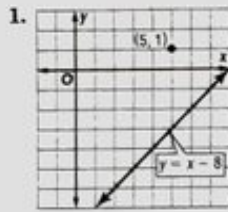
$m = -\frac{3}{1}$ $m_{\perp} = \frac{1}{3}$
 $-4 = \frac{1}{3}(1) + b$
 $-4 = 0.\bar{3} + b$
 $-0.\bar{3} \quad -0.\bar{3}$
 $-4.\bar{3} = b$
 $y = \frac{1}{3}x - 4.\bar{3}$

Write the equation for the line that passes through (-5, 6) and is perpendicular to $4x + 3y = 1$

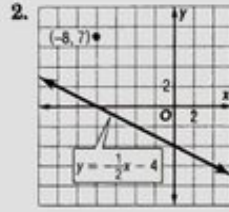
$m = -\frac{4}{3}$ $m_{\perp} = \frac{3}{4}$
Put standard form into slope intercept form
 $4x + 3y = 1$
 $-4x \quad -4x$
 $3y = -4x + 1$
 $\frac{3y}{3} = \frac{-4x + 1}{3}$
 $y = -\frac{4}{3}x + \frac{1}{3}$
 $y = mx + b$
 $6 = \frac{3}{4}(-5) + b$
 $6 = 0.75(-5) + b$
 $6 = -3.75 + b$
 $+3.75 \quad +3.75$
 $9.75 = b$
 $y = \frac{3}{4}x + 9.75$

Exercises

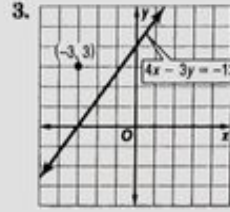
Write the slope-intercept form for an equation of the line that passes through the given point and is parallel to the graph of each equation.



$y = x - 4$



$y = -\frac{1}{2}x + 3$



$y = \frac{4}{3}x + 7$

4. $(-2, 2), y = 4x - 2$

$y = 4x + 10$

5. $(6, 4), y = \frac{1}{3}x + 1$

$y = \frac{1}{3}x + 2$

6. $(4, -2), y = -2x + 3$

$y = -2x + 6$

7. $(-2, 4), y = -3x + 10$

$y = -3x - 2$

8. $(-1, 6), 3x + y = 12$

$y = -3x + 3$

9. $(4, -6), x + 2y = 5$

$y = -\frac{1}{2}x - 4$

10. Find an equation of the line that has a y-intercept of 2 that is parallel to the graph of the line $4x + 2y = 8$. $y = -2x + 2$

11. Find an equation of the line that has a y-intercept of -1 that is parallel to the graph of the line $x - 3y = 6$. $y = \frac{1}{3}x - 1$

12. Find an equation of the line that has a y-intercept of -4 that is parallel to the graph of the line $y = 6$. $y = -4$

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Use the point-slope form to find the equation.

$y - y_1 = m(x - x_1)$	Point-slope form
$y - 2 = -\frac{3}{2}(x - (-4))$	$m = -\frac{3}{2}, (x_1, y_1) = (-4, 2)$
$y - 2 = -\frac{3}{2}(x + 4)$	Simplify.
$y - 2 = -\frac{3}{2}x - 6$	Distributive Property
$y = -\frac{3}{2}x - 4$	Slope-intercept form

Exercises

Write the slope-intercept form for an equation of the line that passes through the given point and is perpendicular to the graph of each equation.

1. $(4, 2), y = \frac{1}{2}x + 1$

$y = -2x + 10$

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

$y = \frac{3}{2}x - 6$

3. $(6, 4), y = 7x + 1$

$y = -\frac{1}{7}x + \frac{34}{7}$

4. $(-8, -7), y = -x - 8$

$y = x + 1$

5. $(6, -2), y = -3x - 6$

$y = \frac{1}{3}x - 4$

6. $(-5, -1), y = \frac{5}{2}x - 3$

$y = -\frac{2}{5}x - 3$

7. $(-9, -5), y = -3x - 1$

$y = \frac{1}{3}x - 2$

8. $(-1, 3), 2x + 4y = 12$

$y = 2x + 5$

9. $(6, -6), 3x - y = 6$

$y = -\frac{1}{3}x - 4$

10. Find an equation of the line that has a y-intercept of -2 and is perpendicular to the graph of the line $x - 2y = 5$. $y = -2x - 2$

11. Find an equation of the line that has a y-intercept of 5 and is perpendicular to the graph of the line $4x + 3y = 8$. $y = \frac{3}{4}x + 5$

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Given a Point and an Equation Parallel

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

Write the equation for a line using point-slope form of an equation for the line that passes through (1, -4) and is parallel to $y = -3x - 7$

x_1, y_1

$$y - (-4) = -\frac{3}{1}(x - 1)$$

$$y + 4 = -3x + 3$$

$$y = -3x - 1$$

$m = -\frac{3}{1}$

Write the using point-slope form of an equation for the line that passes through (-5, 6) and is parallel to $4x + 3y = 1$

$$4x + 3y = 1$$

$$-4x \quad -4x$$

$$3y = -4x + 1$$

$$y = -\frac{4}{3}x + \frac{1}{3}$$

$$y - 6 = -\frac{4}{3}(x + 5)$$

$$y - 6 = -\frac{4}{3}x - \frac{20}{3}$$

$$y = -\frac{4}{3}x - \frac{14}{3}$$

Given a Point and an Equation Perpendicular

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

Write the using point-slope form of an equation for the line that passes through (1, -4) and is perpendicular to $y = -3x - 7$

$$y - (-4) = \frac{1}{3}(x - 1)$$

$$y + 4 = \frac{1}{3}x - \frac{1}{3}$$

$$y = \frac{1}{3}x - \frac{13}{3}$$

$m = -\frac{3}{1}$ $m_{\perp} = \frac{1}{3}$

Write the using point-slope form of an equation for the line that passes through (-5, 6) and is perpendicular to $4x + 3y = 1$

$$m = -\frac{4}{3} \quad m_{\perp} = \frac{3}{4}$$

$$y - 6 = \frac{3}{4}(x + 5)$$