LESSON 4.3

Writing Equations of Perpendicular & Parallel Lines

LEARNING GOALS:

1) Write the equation of a line that is parallel to a given line.

2) Write the equation of a line that is perpendicular to a given line.

Common Core State Standards
HSA-CED.A.2, HSF.LE.A.2

BELLWORK #1: Answer each question.

1) What does parallel mean?
lines that never intersect

2) If two lines are parallel, then their slopes are
equal (the exact same number)

3) What does perpendicular mean?
lines that intersect to form 4 right angles

4) If two lines are perpendicular, then their slopes are
opposite reciprocals.

BELLWORK #2: Write the opposite reciprocal.

A) $\frac{2}{5}$	B) $-\frac{7}{3}$	C) -2	D) $\frac{1}{8}$	E) 1
$-\frac{5}{2}$	$\frac{3}{7}$	$\frac{1}{2}$	-8	-1

LESSON 4.3 - Parallel and Perpendicular Lines

- So far, we know how to write the equation of a line if we are given...
  - The slope and the y-intercept
  - The slope and any point on the line
  - Any two points on the line.
- But what if we aren't given the slope? What if we are given a line that our line is parallel or perpendicular to instead? Do you think we can write the equation of the line then?

- **YES!!!** - :)

Write the equation of the line that passes through the given point and is PARALLEL to the given line.

$(1, 4)$ and $y = -2x + 3$

$y - 4 = -2(x - 1)$

$y - 4 = -2x + 2$

$y = -2x + 6$

Write the equation of the line that passes through the given point and is PARALLEL to the given line.

$(-10, 0)$ and $y = -\frac{4}{5}x + 7$

$y - 0 = -\frac{4}{5}(x - (-10))$

$y = -\frac{4}{5}x - 8$

Write the equation of the line that passes through the given point and is PARALLEL to the given line.

(9, -8) and $y = -\frac{1}{3}x + 7$

$y - (-8) = -\frac{1}{3}(x - 9)$

$y + 8 = -\frac{1}{3}x + 3$

$y = -\frac{1}{3}x - 5$

Write the equation of the line that passes through the given point and is PARALLEL to the given line.

(-2, 5) and $y = \frac{3}{2}x - 10$

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

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

$y = \frac{3}{2}x + 8$

Write the equation of the line that passes through the given point and is PARALLEL to the given line.

(7, -10) and $y = -x + 8$

$y - (-10) = -1(x - 7)$

$y + 10 = -x + 7$

$y = -x - 3$

Write the equation of the line that passes through the point and is PERPENDICULAR to the given line.

(-8, 3) and $y = -\frac{4}{3}x - 5$

$y - 3 = \frac{3}{4}(x - (-8))$

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

$y = \frac{3}{4}x + 9$

Write the equation of the line that passes through the point and is PERPENDICULAR to the given line.

(6, -5) and $y = \frac{3}{2}x + 7$

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

$y + 5 = -\frac{2}{3}x + 4$

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

Write the equation of the line that passes through the point and is PERPENDICULAR to the given line.

(2, -8) and $y = \frac{1}{6}x + 5$

$y - (-8) = -6(x - 2)$

$y + 8 = -6x + 12$

$y = -6x + 4$

Write the equation of the line that passes through the point and is PERPENDICULAR to the given line.

(-12, -1) and $y = -4x - 13$

$y - (-1) = -\frac{1}{4}(x - (-12))$

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

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

Write the equation of the line that passes through the point and is PERPENDICULAR to the given line.

(9, -1) and $y = x - 10$

$y - (-1) = -1(x - 9)$

$y + 1 = -x + 9$

$y = -x + 8$

Find the equation of the line that passes through the point (-4, -1) and is parallel to the line that passes through the points (-2, -10) and (6, 2).

$m = \frac{2 - (-10)}{6 - (-2)} = \frac{12}{8} = \frac{3}{2}$

$y - (-1) = \frac{3}{2}(x - (-4))$

$y + 1 = \frac{3}{2}x + 6$

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

Find the equation of the line that passes through the point (3, 7) and is parallel to the line that passes through the points (6, 12) and (-9, -13).

$m = \frac{-13 - 12}{-9 - 6} = \frac{-25}{-15} = \frac{5}{3}$

$y - 7 = \frac{5}{3}(x - 3)$

$y - 7 = \frac{5}{3}x - 5$

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

Find the equation of the line that passes through the point (-4, 2) and is parallel to the line that passes through the points (10, 0) and (-6, -8).

$m = \frac{-8 - 0}{-6 - 10} = \frac{-8}{-16} = \frac{1}{2}$

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

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

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

Find the equation of the line that passes through the point (-8, -5) and is perpendicular to the line tha passes through the points (9, 2) and (-3, 10).

$m = \frac{10 - 2}{-3 - 9} = \frac{8}{-12} = -\frac{2}{3}$

$y - (-5) = \frac{3}{2}(x - (-8))$

$y + 5 = \frac{3}{2}x + 6$

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

4.3 NOTES - Parallel and Perpendicular Lines

Find the equation of the line that passes through the point $(12, -2)$ and is perpendicular to the line that passes through the points $(-2, -5)$ and $(1, 7)$.

$$m = \frac{7 - (-5)}{1 - (-2)} = \frac{12}{3} = 4$$

$$y - (-2) = -\frac{1}{4}(x - 12)$$

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

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

Find the equation of the line that passes through the point $(1, -4)$ and is perpendicular to the line that passes through the points $(0, -6)$ and $(-10, 4)$.

$$m = \frac{4 - (-6)}{-10 - 0} = \frac{10}{-10} = -1$$

$$y - (-4) = 1(x - 1)$$

$$y + 4 = x - 1$$

$$y = x - 5$$

Find the equation of the line that passes through the points $(4, 3)$ and $(-5, 3)$. Then find the equation of the line that is perpendicular to that line and passes through the point $(-7, 3)$.

$$m = \frac{3 - 3}{-5 - 4} = \frac{0}{-9} = 0$$

$$y - 3 = 0(x - 4)$$

$$y - 3 = 0x + 0$$

$y = 3$ This line is horizontal. A line that is perpendicular to this would be vertical. Vertical lines are always an $x =$ # equation. Find the x value of the point the line passes through. Set that equal to x

$x = -7$ This is the line that would be perpendicular to the original line and pass through the point $(-7, 3)$

HOMEWORK:

4.3 Worksheet - Writing Equations for Parallel and Perpendicular Lines