Name:_____   Date:_____

Notes
Algebra Section 5.5
Pages 319-324

Goal: "You will write equations of parallel and perpendicular lines"
Vocabulary:

Parallel: Two lines are always the same <u>distance</u> apart and will never <u>intersect.</u>

    Parallel lines have the same <u>slope.</u>

    Symbol: ‖

Perpendicular: Two lines that <u>intercect</u> to form a <u>right</u> <u>angle.</u>

    The <u>slope</u> of <u>perpendicular</u> lines are <u>opposite</u> <u>reciprocals.</u>

    Ex: 5 and $-\frac{1}{5}$ $-\frac{2}{3}$ and $\frac{3}{2}$ $\frac{1}{3}$ and -3

    Symbol: ⊥

Write an Equation with the Given Information:

1) Passes through $(-3, -5)$ ‖ to $y = 3x - 1$

2) What do you know? $x = -3$ $y = -5$ $m = 3$ $b = ?$

3) Plug the known values into $y = mx + b$. $-5 = 3(-3) + b$

4) Solve for the unknown value. $-5 = -9 + b$

                                         $4 = b$

5) Write the equation.

    Plug in the values for m and b. $y = 3x + 4$

    Leave x and y as variables.

Try These: Follow the steps above.

1) Passes through $(-2, 11)$ ‖ to $y = -x + 5$ $11 = -1(-2) + b$ plug in

$x = -2$ $y = 11$ $m = -1$ $b = ?$ $11 = 2 + b$ solve

                                           $9 = b$

                                    $y = -x + 9$ write equation

2) Passes through $(-3, 3)$ ‖ to $y + 2x = 1$ Write in slope-intercept form. $y = -2x + 1$

$x = -3$ $y = 3$ $m = -2$ $b = ?$ $3 = -2(-3) + b$ plug in

                                        $3 = 6 + b$ solve

                                       $-3 = b$

                                      $y = -2x - 3$ write equation

Determine which lines, if any, are parallel or perpendicular: (put in slope-intercept form first)

1.
a. $y = 5x - 3$

b. $x + 5y = 2$
$y = -\frac{1}{5}x + \frac{2}{5}$

c. $-10y - 2x = 0$
$y = -\frac{1}{5}x$

slope=5

slope=$-\frac{1}{5}$

slope=$-\frac{1}{5}$

Lines b and c are parallel. Line a is perpendicular to both b and c.

2.
a. $y = -3x + 1$

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

c. $2x - 6y = 4$
$y = \frac{1}{3}x - \frac{2}{3}$

slope= -3

slope= $\frac{1}{3}$

slope= $\frac{1}{3}$

Lines b and c are parallel. Line a is perpendicular to both b and c.

3.
a. $-1.5y + 4.5x = 6$
$y = -4 + 3x$

b. $y = 3x - 8$

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

slope= 3

slope= 3

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

Lines a and b are parallel. Line c is perpendicular to both a and b.

Write the equation of the line with the given information:

1) Passes through $(4, -5)$ $\perp$ to $y = 2x + 3$

2) What do you know? $x = 4$ $y = -5$ $m = -\frac{1}{2}$ $b = ?$

3) Plug in the known values into $y = mx + b$. $-5 = -\frac{1}{2}(4) + b$

4) Solve for the unknown value. $-5 = -2 + b$

5) Write the equation. $-3 = b$

   Plug in the values for m and b. $y = -\frac{1}{2}x - 3$

   Leave x and y as variables.

Try These:
1) Passes through $(4, 3)$ $\perp$ $y = 4x - 7$
$x = 4$ $y = 3$ $m = -\frac{1}{4}$ $b = ?$
$3 = -\frac{1}{4}(4) + b$

$3 = -1 + b$
 $4 = b$

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

2) Passes through $(4, -2)$ $\perp$ $y - 4x = 2$ $y = 4x + 2$
$x = 4$ $y = -2$ $m = -\frac{1}{4}$ $b = ?$
$-2 = -\frac{1}{4}(4) + b$

$-2 = -1 + b$
 $-1 = b$

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