Algebra 1 Key Unit 4, Lesson 6 Notes Parallel/Perpendicular Lines

Name _____ Block _____ Date _____

Essential Questions:

1) How do I write a linear equation in standard form?
2) " " " find the equation of a line that's parallel or perpendicular to another line?

Standard Form

3 Forms of Linear Equations:

Slope-Intercept Form: $y = mx + b$

Point-Slope Form: $y - y_1 = m(x - x_1)$

Standard Form: $Ax + By = C$

**** To be in standard form the A value must be a whole # (no fraction, no decimal, no negative)

Re-write each equation in standard form. *Remember: the A value must be a whole number (that means it's positive!!!)

a) $y = -3x + 4$

$3x + y = 4$

b) $y = 2x - 5$

$-2x + y = -5$

$2x - y = 5$

c) $2y = -5x + 2$

$5x + 2y = 2$

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

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

$2x - 3y = 15$

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

$-2\left(-\frac{1}{2}x + y\right) = (-3)-2$

$x - 2y = 6$

f) $y - 5 = 3(x + 2)$

$y - 5 = 3x + 6$

$-3x + y = 11$

$3x - y = -11$

Fill in the table.

Slope-Intercept	Point-Slope	Standard
$y = -2x + 3$	xxxxxxxxxx	$2x + y = 3$
$y = \frac{2}{3}x - 4$	xxxxxxxxxx	$2x - 3y = 12$
$y = 3x + 12$	$y - 9 = 3(x+1)$ $y - 9 = 3x + 3$ $y = 3x + 12$	$3x - y = -12$
$y = 4x - 10$	$y + 2 = 4(x - 2)$	$4x - y = 10$

$-3y = -2x + 12$

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

$-4x + y = -10$

$4x - y = 10$

$y + 2 = 4x - 8$

$y = 4x - 10$

Parallel Lines

Two lines are parallel if they have the same slope

Examples: Find an equation of the line parallel to the given equation that goes through the given point. *Write your answer in* ***slope-intercept form*** *AND* ***standard form.***

1. $y = 4x - 7$; (2,6)

$m = 4$ $(2,6)$

$y = mx + b$
$6 = 4(2) + b$
$6 = 8 + b$
$-2 = b$

$y = 4x - 2$

$4x - y = 2$

Slope – Intercept Form: $y = 4x - 2$

Standard Form: $4x - y = 2$

2. $y - 4 = 2(x + 5)$; (-1, 1)

$m = 2$ $(-1,1)$

$y = mx + b$
$1 = (2)(-1) + b$
$3 = b$

$y = 2x + 3$

$-2x + y = 3$

$2x - y = -3$

Slope – Intercept Form: $y = 2x + 3$

Standard Form: $2x - y = -3$

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

$m = 3$ $(-3, -5)$

$y = mx + b$
$-5 = 3(-3) + b$
$-5 = -9 + b$
$4 = b$

$-3x + y = 4$

$3x - y = -4$

Slope – Intercept Form: $y = 3x + 4$

Standard Form: $3x - y = -4$

Perpendicular Lines

Two lines are perpendicular if the slopes are negative reciprocals

neg. rec. ex: $\frac{7}{2} \rightarrow -\frac{2}{7}$ / $3 \rightarrow -\frac{1}{3}$ / $-\frac{4}{5} \rightarrow \frac{5}{4}$

Examples: Find an equation of the line perpendicular to the given equation that goes through the given point. *Write your answer in* ***slope-intercept form*** *AND* ***standard form.***

1. $y = 4x + 2$; (4,-2)

$m = -\frac{1}{4}$ $(4,-2)$

$y = mx + b$
$-2 = -\frac{1}{4}(4) + b$
$-2 = -1 + b$
$-1 = b$

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

$x + 4y = -4$

Slope – Intercept Form: $y = -\frac{1}{4}x - 1$

Standard Form: $x + 4y = -4$

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

$m = -\frac{1}{4}$ $(4,3)$

$y = mx + b$
$3 = -\frac{1}{4}(4) + b$
$3 = -1 + b$
$4 = b$

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

$x + 4y = 16$

Slope – Intercept Form: $y = -\frac{1}{4}x + 4$

Standard Form: $x + 4y = 16$

3. $y = 2x + 3$; (4, -5)

$m = -\frac{1}{2}$ $(4,-5)$

$y = mx + b$
$-5 = -\frac{1}{2}(4) + b$
$-5 = -2 + b$
$-3 = b$

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

$x + 2y = -6$

Slope – Intercept Form: $y = -\frac{1}{2}x - 3$

Standard Form: $x + 2y = -6$

Word Problems

1) Mary can purchase Vinca plants for $1.20 per plant. Phlox is on sale for $2.50 per plant. Write an equation in standard form that models the possible combinations of vinca and phlox plants Mary can buy for $300. List three of these possible combinations.

x = # Vinca plants
y = # phlox plants

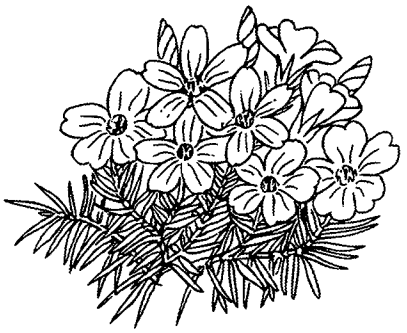
$1.20x + 2.50y = 300$

$2.50y = -1.20x + 300$

$y = \frac{-1.2}{2.5}x + \frac{300}{2.5}$

$y = \frac{-1.2}{2.5}x + 120$

Vinca	Phlox
25	108
0	120
125	60
250	0



2) A snack mix requires a total of 120 oz. of some corn cereal and some wheat cereal. Corn cereal comes in 12 oz. boxes.

a. The last time you made this mix, you used 5 boxes of corn cereal and 4 boxes of wheat cereal. How many oz. are in a box of wheat cereal?

C = # boxes corn cereal

w = # boxes wheat cereal

$5c + 4w = 120$

$5(12) + 4w = 120$

$4w = 60$

$w = 15$

15 oz. in a box of wheat cereal.

b. Write an equation in standard form that models the possible combinations of boxes of wheat and corn cereal you can use.

$12x + 15y = 120$

or

$4x + 5y = 40$

c. List all possible combination of whole boxes of wheat and corn ceral you can use to make the snack mix.

$15y = -12x + 120$

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

Corn	Wheat
0	8
5	4
10	0