

# Algebra 1A

## Lesson 5.4

### Writing Linear Equations in Standard Form

#### Warm-Up

Use the given information to write an equation of the line in point-slope form (PS) first and then slope-intercept form (SI).

(a)  $m = 3$   $(-1, 5)$

PS  $y - 5 = 3(x + 1)$   
 $y - 5 = 3x + 3$

SI  $y = 3x + 8$

(b)  $(1, 4)$   $(6, -1)$   $m = \frac{-1-4}{6-1} = \frac{-5}{5} = -1$

-or-  $y - 4 = -(x - 1)$   
 PS  $y + 1 = -(x - 6)$   
 $y + 1 = -x + 6$

SI  $y = -x + 5$

(c)  $(-1, -2)$   $(2, 7)$   $m = \frac{7-(-2)}{2-(-1)} = \frac{9}{3} = 3$

-or-  $y + 2 = 3(x + 1)$   
 PS  $y - 7 = 3(x - 2)$   
 $y - 7 = 3x - 6$

SI  $y = 3x + 1$

### Standard Form of a Linear Equation

The Standard Form of a linear equation is:

$$Ax + By = C$$

where A, B and C are all integers, A and B are not both zero, and A is positive.

#### Example 1. Write a Standard Form Equation from a Graph

Consider the graph at the right.

(a) Find the slope of the line shown.

$$\frac{\text{rise}}{\text{run}} = \frac{-4}{2} = -2$$

(b) Write an equation in Point-Slope form using one of the ordered pairs and your slope from part (a).

$(4, -2)$   $-2$   
 POINT Slope  
 $y + 2 = -2(x - 4)$

(c) Rewrite the equation in Standard Form.

$$y + 2 = -2x + 8$$

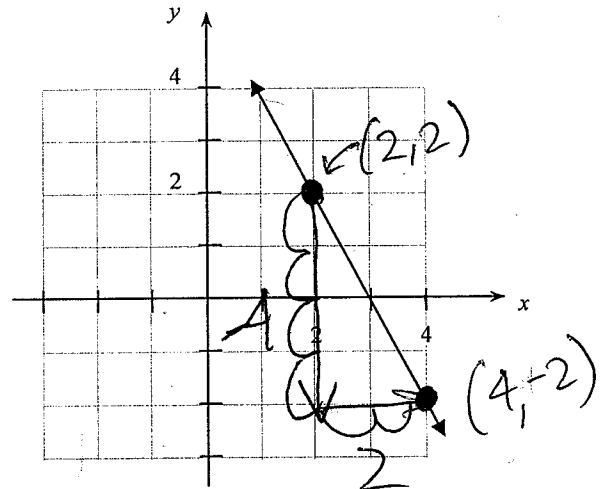
$$y = -2x + 6$$

$$2x + y = 6$$

$$A = 2$$

$$B = 1$$

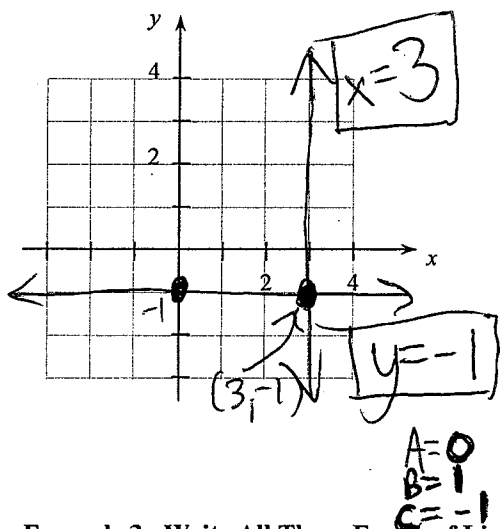
$$C = 6$$



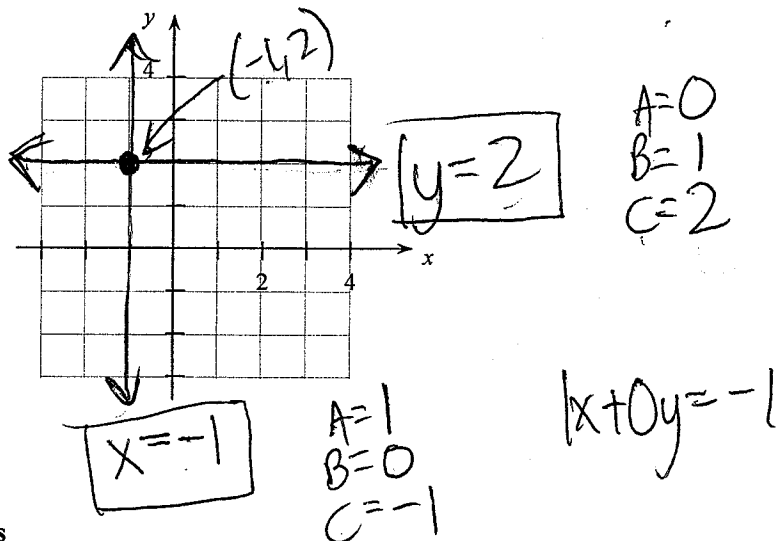
**Example 2. Write Equations of Horizontal and Vertical Lines**

Plot the given point. Then write an equation of the horizontal and vertical line passing through the given point.

(a) (3, -1)



(b) (-1, 2)



**Example 3. Write All Three Forms of Linear Equations**

Use the given information to write the equation of the line in point-slope form (PS), slope-intercept form (SI) and standard form (SF).

(a)  $m = \frac{1}{3}$   $(9, 5)$

PS  $y - 5 = \frac{1}{3}(x - 9)$

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

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

$-\frac{1}{3}x$   $-\frac{1}{3}x$

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

$x - 3y = -6$

$A=1$   
 $B=-3$   
 $C=-6$

(b)  $(5, 7)$   $(19, 14)$

PS  $y - 7 = \frac{1}{2}(x - 5)$

$y - 7 = \frac{1}{2}x - \frac{5}{2}$   
 $+7$   $+\frac{7}{2}$

SI  $y = \frac{1}{2}x + \frac{9}{2}$

$-\frac{1}{2}x$   $-\frac{1}{2}x$

SF  $(-2)(-\frac{1}{2}x + y) = (\frac{9}{2})(-2)$

$x - 2y = -9$

$m = \frac{14-7}{19-5} = \frac{7}{14} = \frac{1}{2}$

$A=1$   
 $B=-2$   
 $C=-9$

**Homework:**

New: Pg. 314 #12-28 (evens)

**Review:**

For each of the following equations: (a) find the x and y intercept, (b) write the equation in slope-intercept form, (c) and then graph.

1.  $2y = 4x + 6$

2.  $x + y = 3$

3.  $2x - 4y = 12$