5.4: Writing Equations of Lines in Standard Form

Goals: *Write equivalent standard form equations
*Write equations in standard form
*Complete standard form equations
*Use standard form equations to solve combination problems

STANDARD FORM!

$$Ax + By = C$$

*A is always the coefficient of x
*B is always the coefficient of y
*C is always the constant
*Want A to be positive and also no fractions or decimals

1. Write equivalent equations in standard form:
For each equation write two equivalent standard form equations:

Ex: $2x - 6y = 4$

$x - 3y = 2$
$4x - 12y = 8$

Ex: $x - y = 3$

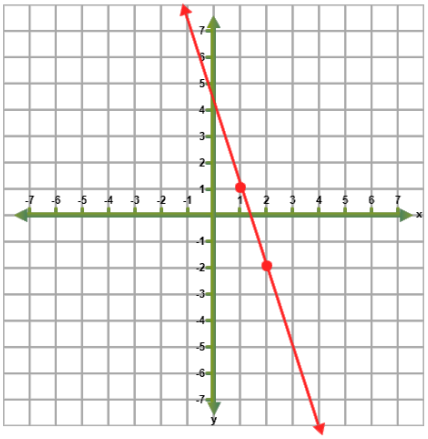
$2x - 2y = 6$
$3x - 3y = 9$

Ex: $x + 4y = 3$

$2x + 8y = 6$
$3x + 12y = 9$

2. Write equations in standard form with given information.

Ex:



$m = \frac{-2-1}{2-1} = \frac{-3}{1} = -3$

$y = mx + b$

$1 = -3(1) + b$
$1 = -3 + b$
$+3 \quad +3$
$4 = b$
$y = -3x + 4$
$+3x \quad +3x$

$3x + y = 4$

Ex: passes through (3, –1) (2, –3)

$2x - y = 7$

When you put this equation in standard form it is

$-2x + y = -7$, but A should be positive so multiply everything

by –1.

Ex: passes through (2, 2) (4, –2)

$2x + y = 6$

Ex: (0, −3) and (6, 0)

$\frac{0-(-3)}{6-0} = \frac{3}{6} = \frac{1}{2}$

1. Start by writing the equation in $y = mx + b$

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

SHORTCUT (Remember that if $x = 0$, then you have the y-intercept!)

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

Bring the x term over to be on the same side as y

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

Remember that A, B, and C need to be integers, and A also needs to be positive. So in this problem multiply everything by −2.

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

$x + -2y = 6$

3. Complete an equation in standard form

For each equation use the information to find the missing coefficient. Then write the equation in standard form.

Ex: $Ax + 3y = 2$, passes through the point (–1, 0)

$A(-1) + 3(0) = 2$
$-A = 2$
$A = -2$
$-2x + 3y = 2$
$2x - 3y = -2$

Ex: $-4x + By = 7$, passes through the point (–1, 1)

$-4(-1) + B(1) = 7$
$4 + B = 7$
$B = 3$
$-4x + 3y = 7$
$4x - 3y = -7$

Ex: $Ax + 4y = 6$, passes through the point (2, 0)

$3x + 4y = 6$

Ex: $Ax + y = -3$, passes through the point (2, 11)

$7x - y = 3$

Ex: Your class is taking a trip to the public library. You can travel in small and large vans. A small van holds 8 people and a large van holds 12 people. One possible way your class could get there is to fill 15 small vans and 2 large vans.

a. Write an equation to model all of the possible combinations of small and large vans your class could take. If one possibility is 15 small vans and 2 large vans then multiply 15 and 8 and 12 and 2 to find the total number of people that need to go.

$8x + 12y = 144$

b. Graph the equation.

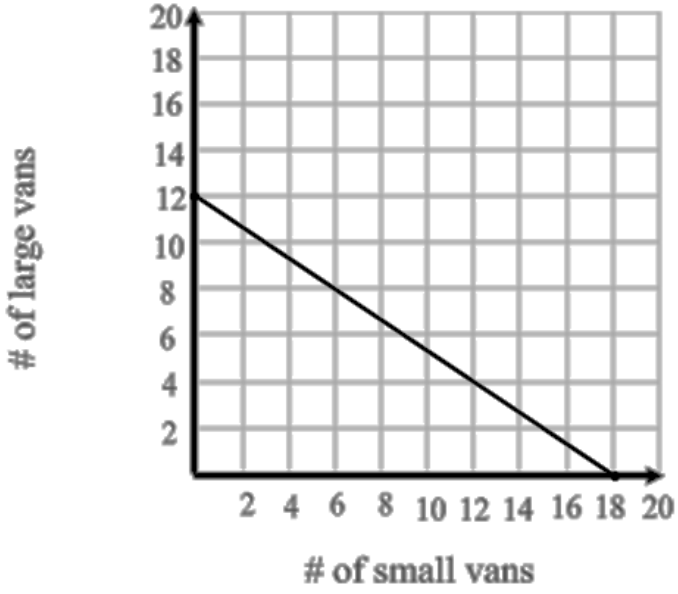
c. Use your graph to find more possible combinations of vans.

12 small vans, 4 large vans

0 small vans, 12 large vans

18 small vans, 0 large vans

6 small vans, 8 large vans



Ex: At a flea-market t-shirts cost $4.50 and shorts cost $6. You have enough money that if you wanted to you could buy exactly 12 t-shirts and 9 pairs of shorts.

a. Write an equation to model all of the possible combinations of t-shirts and shorts that you can buy.

$4.5x + 6y = 108$

b. Graph the equation.

c. List the possible combinations of t-shirts and shorts you can buy.

0 T-Shirts, 18 shorts

24 T-shirts, 0 shorts

16 T-shirts, 6 shorts

8 T-shirts, 12 shorts