Convert between Linear Forms 1_2

There are two common forms of linear equations with two variables.

- When the values of one variable depend on those of another, it is common to express the relationship as $y = mx + b$. This equation is in **slope-intercept form.**

- When the values of the two variables combine to produce a fixed third quantity, you can express the relationship as $Ax + By = C$. This equation is in **standard form.** The equations in Problem 1.1 are in standard form.

The graph of each type of equation is a straight line. Since you know a lot about the graphs of **linear functions,** it is natural to ask: Given an equation in one form, can you rewrite the equation in the other form?

A Four students tried to write $12x + 3y = 9$ in equivalent $y = mx + b$ form. Did each student get an equation equivalent to the original $Ax + By = C$ form? If so, explain the reasoning for each step. If not, tell what errors the student made.

Jared	
$12x + 3y = 9$	
$3y = -12x + 9$	(1)
$y = -4x + 3$	(2)

Molly	
$12x + 3y = 9$	
$3y = 9 - 12x$	(1)
$y = 3 - 12x$	(2)
$y = -12x + 3$	(3)

Mia	
$12x + 3y = 9$	
$4x + y = 3$	(1)
$y = 3 - 4x$	(2)
$y = -4x + 3$	(3)

Ali	
$12x + 3y = 9$	
$3y = 9 - 12x$	(1)
$y = 3 - 4x$	(2)
$y = 4x - 3$	(3)

B Write each equation in $y = mx + b$ form.

1. $x - y = 4$
2. $2x + y = 9$
3. $8x + 4y = -12$
4. $c = ax + dy$

C Write each equation in $Ax + By = C$ form.

   1. $y = 5 - 3x$ **2.** $y = \frac{3}{4}x + \frac{1}{4}$

   3. $x = 2y - 3$ **4.** $fy + 3 = gx - 15$

D Write a linear equation in slope-intercept form or standard form to represent each situation. Then, explain why your choice is the best representation.

   1. Mary is selling popcorn for $5.00 per bucket and hotdogs for $4.75 each. After one hour, she makes $72.50.

   2. Matt is in charge of selling roses for the Valentine's Day dance. The roses sell for $3.75 each. He estimates that the expenses for the roses are $25.00. Matt wants to write an equation for the profit.

   3. Kaylee is mixing paint for an art project. She mixes 5 ounces of green paint with every 3 ounces of white paint. She needs 50 ounces of the paint mixture.