Warm Up

Solve for x:

$$7x + 5(4 - 3x) = 15 - 2(3x - 4)$$

$7x + 20 - 15x = 15 - 6x + 8$

$-8x + 20 = 23 - 6x$

$+6x \qquad +6x$

$-2x + 20 = 23$

$-20 \quad -20$

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

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

Page 14, #'s 5-8 — eg. must balance

Find three pairs of values (x, y) that satisfy each equation. Plot those points and use the pattern to find two more solution pairs. (Hint: What is y if $x = 0$? What is x if $y = 0$?)

5. $6 = 3x - 2y$

6. $10 = x + 2y$

7. $2x + y = 6$

8. $-3x + 4y = -4$ $(0, 1)$

#5

$6 = 3x - 2y$ if $x = 0$

$6 = 3(0) - 2y$ $(0, -3)$

$\frac{6}{-2} = \frac{-2y}{-2}$

$-3 = y$

$6 = 3x - 2y$ if $y = 0$

$6 = 3x - 2(0)$

$\frac{6}{3} = \frac{3x}{3}$ $(2, 0)$

$2 = x$

Let's check other possible solutions:

$6 = 3x - 2y$ $(9, -3)$

$6 = 3(9) - 2(-3)$

$6 \neq 27 + 6$

$6 = 3(4) - 2(3)$ $(4, 3)$

$6 = 12 - 6$

$6 = 6$ ✓

$6 = 3(6) - 2(6)$ $(6, 6)$

$6 = 18 - 12$

$6 = 6$ ✓

$6 = 3x - 2y$ $(-4, 0)$

$6 = 3(-4) - 2(0)$

$6 \neq -12$

$6 = 3x - 2y$ $(1, -1.5)$

$6 = 3(1) - 2(-1.5)$

$6 = 3 + 3$

$6 = 6$ ✓

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1. For a fundraiser, students sell calendars and posters.

a. What equation shows how the income I for the fundraiser depends on the number of calendars c and the number of posters p that are sold?

b. What is the income if students sell 25 calendars and 18 posters?

c. What is the income if students sell 12 calendars and 15 posters?

d. What is the income if students sell 20 calendars and 12 posters?

e. Find three combinations of calendar sales and poster sales that will give an income of exactly $100.

f. Each answer in part (e) can be written as an ordered pair (c, p). Plot the ordered pairs on a coordinate grid.

g. Use your graph to estimate three other (c, p) pairs that would meet the $100 goal.

1.2 Connecting $Ax + By = C$ and $y = mx + b$

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?

As you work on this Problem, look for connections between the two forms of linear equations.

$y = mx + b$

Slope-Intercept Form:

$$y = mx + b$$

slope, y-int

$y = mx + b$

$y = m(0) + b$

$y = b$ ← value of y when $x = 0$

value of y depends on the value of x

Standard Form:

$$Ax + By = C$$

$5x + 10y = 600$

combination of both variables results in a constant value

x: # of shirts

y: # of caps

x-int: ?

$5x + 10y = 600$

$5x + 10(0) = 600$

$\frac{5x}{5} = \frac{600}{5}$

$x = 120$

(120, 0)

120 shirts

0 caps

Problem 1.2

get y alone

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

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

Molly

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

Mia

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

Ali

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

forgot it's $-4x$

Standard Form Ruks:

$$Ax + By = C$$

A, B & C are all integers

A is NOT negative

Problem 1.2 continued

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

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. $fy + 3 = gx - 15$

variables on one side, # on other

Homework

Finish classwork