Equations of the Form $ax + by = c$

Student Activity

Name _____

Class _____

In these activities, you will identify solutions to a linear equation of the form $ax + by = c$. After completing the activities, discuss and/or present your findings to the rest of the class.

Activity 1 [Page 1.3]

1. Suppose Evangeline is at the arcade. The bowling game costs 2 tokens, while the asteroid game costs 3 tokens. Let *a* be the number of tokens it takes to play the asteroid game and *b* the number of tokens it takes to play the bowling game.

   a. Change *a* and *b* on page 1.3 to represent the number of tokens for bowling games and asteroid games. Predict the following patterns: moving up a column; moving across a row to the right; moving up the diagonal from the cell in the lower left to the cell in the upper right. Fill in the values of the table to check your predictions.

   b. Suppose Evangeline had 24 tokens to spend. What combinations of games could she play?

   c. What "exchange" of games will create all the possible combinations of asteroid games and bowling games that cost the same number of tokens? Explain your thinking.

   d. Marj accidentally made her table with *a* and *b* reversed; *b* as the number of asteroid games and *a* as the number of bowling games. Would her answers for question 1b be different? Why or why not?

Activity 2 [Page 2.2]

1. Let *x* represent the number of glasses of water and *y* represent the number of bottles of juice.

   Water is free and juice costs $1.50. Set up the combination table for the combinations of the number of glasses of water and the number of bottles of juice you can get for $4.50.

   a. What is the equation?

   b. Mark three points that satisfy the constraint. Give the ordered pairs for those points.

   c. Describe all of the solutions for the equation and the corresponding graph of the points that are solutions.

   d. Create a context for an equation where the points in the solution for the equation would graph as a vertical line.

2. Decide whether the following are sometimes true, always true, or never true. Be ready to explain your reasoning.

   a. The expression $4x + 3y$ will have the same value as long as an increase of 3 in the value of x is offset by a decrease of 4 in the value of y.

   b. If you change $4x + 3y = c$ to $4x + 3y = d$ where d is different than c, the line graphs of the solution sets will be parallel.

   c. If a is not zero and you solve an equation of the form $ax = b$ or $x + a = b$ for x, you will have exactly one solution.

   d. If a and b are not zero, then an equation of the form $ax + by = c$ will have exactly one solution for x and y.

   e. The solution to an equation of the form $2x + 5y = c$ is a point on a line.