In these activities you will look for relationships between the structure of the expression and its value and verify that expressions are equivalent by using the associative and commutative properties of addition and multiplication, as well as the distributive property. After completing the activities, discuss and/or present your findings to the rest of the class.

## Activity 1 [Page 1.3]

1. Suri has *x* stamps. The number of stamps some of her friends have is described below.

   Write an expression for each. Write the number of stamps your expression will produce for several different values of *x* and explain why the numbers make sense in the context of the problem.

   a. Pat has 5 more than twice as many stamps as Suri.

   b. Kay has 4 less than the number of stamps Suri.

   c. Greg has twice as many as three more than the number of stamps Suri.

   d. How many stamps does Suri have if Greg has 28 stamps?

2. The class is discussing different kinds of expressions created using whole numbers. Do you agree with their statements? Why or why not?

   a. Corry said that if you have $x + 3x + 5x$, all of the *x*'s have to stand for the same number.

   b. Trina thought that if you have $x + 3x + 5x$, each *x* could stand for a different number.

c. Sadee said the value of *x* in the expression $x - 22$ was 22.

d. Petro claimed that the value of *x* in the expression $2x$ had to be an even number.

**Activity 2 [Page 1.4]**

1. Use the files to help answer each of the following:

   a. Carey claims that $2x + 3x + 8$ will give the same values as $5x + 8$ as *x* varies. Do you agree with Carey? Why or why not?

   b. Tomas says that $1x + 4x + 8$ will also give the same values as $5x + 8$. What would you say to Tomas?

   c. Find another expression that will produce the same values as $2x + 8$ as *x* changes.

2 Rewriting an expression using properties of addition and multiplication gives a new expression that is equivalent to the original one. Two expressions are *equivalent* if they have the same value for every possible replacement for the variable or variables. Use the file to decide whether the following are statements are equivalent. Find a property to support your thinking.

   a. $3x + 2$ and $2 + 3x$

   b. $2x + 3$ and $3x + 2$

   c. $3x + 6$ and $3(x + 2)$

   d. $3 + 2(x + 2)$ and $2 + 3(x + 2)$

## Activity 3 [Page 1.4]

1. Use the file to help you think about whether the two expressions are equivalent. Then try to find a mathematical justification for your answer.

   a. $5x + 4x$ and $(5 + 4)x$

   b. $8 + 2x$ and $2(4 + x)$

   c. $4(2x + 5)$ and $8x + 5$

   d. $(3x + 5) + (4x - 1)$ and $7x^2 + 4$

2. Sallee says that $3x + 7$ is equivalent to all of the following. Do you agree with her? Use the file and the structure of the expression to support your reasoning.

   a. $x + x + x + 7$

   b. $x \cdot x \cdot x + 7$

   c. $10x$

   d. $x + 2x + 7$

   e. $3(x + 3) - 2$

3. For each of the following expressions, find two equivalent expressions. (Use the file to check your thinking.) Explain why you think the expressions are equivalent.

   a. $(x+7)+(4x+2)$

   b. $5x^2-3$

   c. $2x(8x+7)+(3x-5)$

   d. $25+2(x+5)$