In these activities you will use geometric figures to explore quadratic expressions. After completing the activities, discuss and/or present your findings to the rest of the class.

Activity 1 [Page 1.3]

1. Reset. Write an expression for the total area of the shapes using the product of the width and height for each area.
   a. Color the horizontal rectangle and the small square green.

   b. Choose blue and color the vertical rectangle.

   c. Color the horizontal rectangle blue.

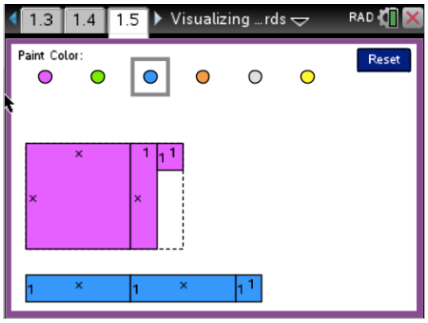
2. a. How are the total areas described in each problem so far related? Explain your reasoning.

   b. How are the expressions related to the total areas for each problem related? Use the distributive property to support your answer.

3. Find an arrangement for the shapes that would illustrate each of the following expressions. Sketch your arrangement.
   a. $x(x+2)+1(1)$
   b. $x(x+1)+1(1)$

Activity 2 [Page 1.5]

1. Use the diagram below to decide whether statements a–d are true or false, then answer e. Explain your thinking in each case.



a. The area of the long rectangle can be represented by $1(x+1)$.

b. $x(x+2)$ represents the area of the rectangle enclosing the irregular shape.

c. The area represented by $(x+2)(x)$ is the same as the area represented by $x(x+2)$.

d. The total area represented by the two shapes will be $x(x+1)+(2x+1)(1)$.

e. Show that the total area represented by the two shapes can be expressed as $(x+1)(x+2)$.

2. Answer each of the following questions.

   a. Sally said that no matter how you rearrange the squares and rectangles in the original figure on page 1.5, the corresponding expressions will always be equivalent to the original product. Do you agree with Sally? Why or why not?

   b. Find at least two ways to explain why $(x+2)(x+1) \neq x^2+2$.

   c. Color all of the non-square rectangles and one small square blue. Explain why the area represented by the blue shapes could be the expression $3(x+1)-2$ or the expression $3x+1$.

   d. Find at least two ways to explain why $(x+1)^2-((x+1)-2)+(2x)$ is equivalent to x^2+3x+2.

3. Answer each of the following. Give a reason for your thinking.

   a. Sketch the diagram that would represent $(x+2)(x+2)$.

   b. Use the sketch in a to help you decide which of the following would be equivalent to x.

      i. x^2+4 ii. x^2+2x+4 iii. x^2+4x+4

   c. Use what you know about the distributive property to help you decide which of the following will be equivalent expressions. Check your thinking using the sketch.

      i. $(x+1)^2+1(x+2)+1(x+1)$

      ii. $x(x+2)+2(x+2)$

      iii. $(x+2)+(x+1)-1(x+1)+2x+3$

      iv. $(x)^2+x(x+2)+1(x+4)$