Algebra I Clarifying Lessons: Multiplying Polynomials and Factoring

OLD Resources. These resources have NOT yet been updated to align with the revised secondary mathematics TEKS. These revised TEKS were adopted by the Texas State Board of Education in 2005, with full implementation scheduled for 2006–07. These resources align with the original TEKS that were adopted in 1998 and should be used as a starting point only.

What is a Clarifying Lesson?

A model lesson teachers can implement in their classroom. Clarifying Lessons combine multiple TEKS statements and may use several Clarifying Activities in one lesson. Clarifying Lessons help to answer the question "What does a complete lesson look like that addresses a set of related TEKS statements, and how can these TEKS statements be connected to other parts of the TEKS?"

TEKS Addressed in This Lesson

Foundations for functions: b.4.B

Quadratic and other nonlinear functions: d.2.A

Materials

- Algebra blocks
- Assessment worksheet

Lesson Overview

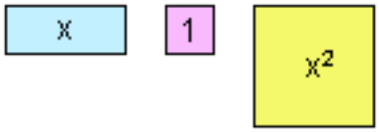
Students use concrete models (algebra blocks) to demonstrate their processes for solving quadratic equations.

Mathematics Overview

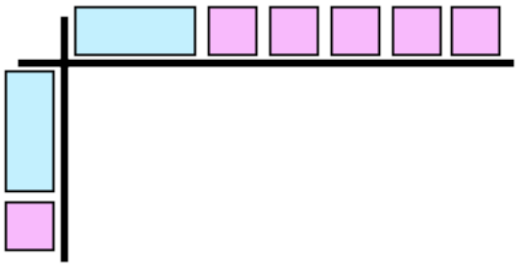
Students apply the commutative, associative, and distributive properties to simplify algebraic expressions and to solve quadratic equations.

Set-up (to set the stage and motivate the students to participate)

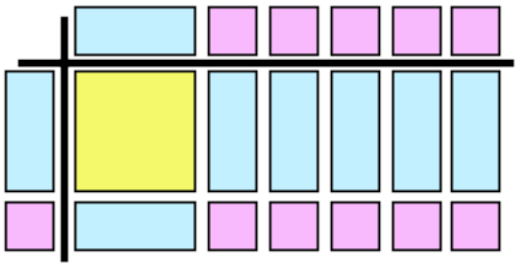
1. Use algebra blocks to demonstrate the following:



Name the factors: (x + 1)(x + 5)



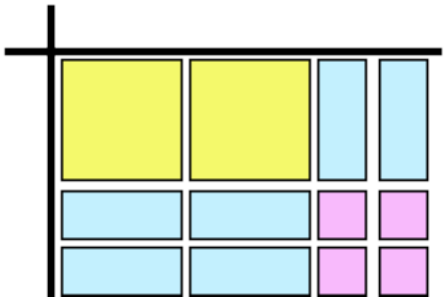
Name the product: $x^2 + 6x + 5$



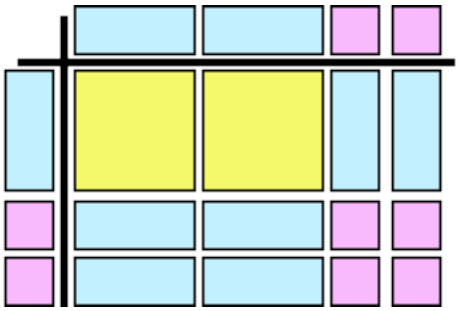
Do a few more examples of this type.

2. Use algebra blocks to demonstrate the following:

Name the product: $2x^2 + 6x + 4$



Name the factors: (2x + 2)(x + 2)



Do a few more examples of this type.

Teacher Notes (to personalize the lesson for your classroom)

Guiding Questions (to engage students in mathematical thinking during the lesson)

- What does each shape algebra block represent (d.2.A)? (the small square represents an area of 1, 1 times 1; the non-square rectangle represents an area of x, 1 times x; the large square represents an area of x^2, x times x)
- How can we represent a set of algebra blocks (d.2.A)? (One way is to show them as a sum--a set consisting of a large square block and a long block is $x^2 + x$.)
- How can we use the algebra blocks to represent a polynomial expression (d.2.A)? (For example, 2x + 4 would be represented with two long blocks and four small squares.)
- How can we use the algebra blocks to represent a product of two polynomial factors (d.2.A)? (Since finding area is one interpretation of multiplication, the product of two polynomial factors could be represented by the algebra blocks that would cover the area of a rectangle whose dimensions are the same as the two polynomial factors.)

Teacher Notes (to personalize the lesson for your classroom)

Summary Questions (to direct students' attention to the key mathematics in the lesson)

- What patterns do you see when you multiply two polynomials, (x + a) and (x + b)? (b.4.B)(The product is always the sum of an x^2 term whose coefficient is 1, an x term whose coefficient is the sum a + b, and a constant term that is the product of a and b.)

- How does this pattern change when the factors are (2x + a) and (x + b)? (b.4.B) (Then the x^2 term has a coefficient of 2 instead of 1, and the coefficient of the x term is changed to the sum a + 2b.)

Teacher Notes (to personalize the lesson for your classroom)

Assessment Task(s) (to identify the mathematics students have learned in the lesson)

Have students complete the assessment worksheet, working either individually or in pairs.

Teacher Notes (to personalize the lesson for your classroom)

Extension(s) (to lead students to connect the mathematics learned to other situations, both within and outside the classroom)

Have students draw their own tile factors to multiply and quadratic equations to factor.

Teacher Notes (to personalize the lesson for your classroom)