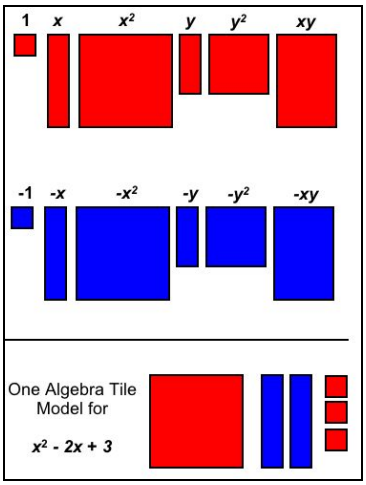
TIPS for Manipulatives
ALGEBRA TILES



What are they?

Algebra tiles are rectangular shapes that provide area models of variables and integers. They usually consist of "*x*" sets and "*y*" sets. Different pieces are used to model 1, x, x^2, y, y^2, and xy. Sets consist of two different colours to represent both positive and negative terms. Overhead versions are used for whole class learning opportunities. A clear plastic organizer is used to prevent tiles from moving around.

How do they help students?

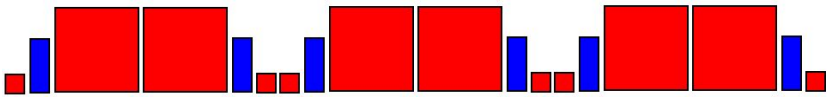
Algebra tiles are used to build concrete area representations of abstract algebraic concepts. The concrete representations help students become comfortable with using symbols to represent algebraic concepts. Algebra tiles are typically used to explore integers, algebraic expressions, equations, factoring, and expanding. They can also used to explore fractions and ratios. The square pieces can be used for some activities that require colour tiles.

How many are recommended?

Students usually work in pairs or small groups when using algebra tiles. Each pair of students needs an "*x*" set, a "*y*" set and a plastic organizer. Students can use card stock to create algebra tile sets for home use. Other representations can also be created using card stock (e.g. "z" sets). A transparent set of tiles is useful for overhead demonstrations by students and/or teachers. When students first use algebra tiles, allow for exploration time.

What are some sample activities?

1. Determine the number of different ways that zero (0) can be represented using tiles from a set of 3 blue "one-tiles" and 2 red "one-tiles".
2. Use the "one-tiles" to model different integer values (e.g. a loss of $4; 2 m above sea level).
3. Create models for integer operations e.g. show that (-4) + (+1) = -3; show that 2(-3) = -6
4. Build an algebra tile model to show that $2x + 3 – 4x – 2 + 5x – 1 = 3x$
5. Build an algebra tile model to show that $(2x + 3) + (-5x – 3) = -3x$
6. Build an algebra tile representation of $2(3x + 1)$. Use the model to show that $2(3x + 1) = 6x + 2$.
7. Make two different models of the ratio 3:2.
8. Build algebra tile models for $(x + 1)^2$ and $x^2 + 1$. Use your models to explain why these expressions are not equivalent.
9. Try to arrange two red "*x*-tiles" and three red "one-tiles" into one rectangular arrangement. (This activity builds understanding of factoring.) Can a rectangular arrangement always be made?
10. Jen used a set of "*x*" tiles to model $2x^2 – 3x + 4$. Can the same model be used to represent $2a^2 – 3a + 4$
11. Use the red "one-tiles" tiles to show all possible factors of 12.
12. Build a tile train. What is the colour and shape of the 200th cube in the train?



Are there any recommended websites?

http://matti.usu.edu/nlvm/nav/frames_asid_189_g_3_t_2.html?open=activities - virtual algebra tiles
http://matti.usu.edu/nlvm/nav/category_g_4_t_2.html - virtual algebra tiles with activities
http://regentsprep.org/Regents/math/teachres/ttiles.htm - homemade algebra tiles
http://www.pbs.org/teachersource/mathline/lessonplans/hsmp/yoyo/yoyo_procedure.shtm - activity
http://www.uen.org/Lessonplan/preview.cgi?LPid=6393 - substitution with algebra tiles
www.phschool.com/professional_development/teaching_tools/pdf/using_algebra_tiles.pdf - algebra tile PD
http://illuminations.nctm.org/swr/review.asp?SWR=227 - understanding factoring