

Algebra Tiles and Equation Solving

Reporting Category Equations and Inequalities

Topic Using manipulatives to solve equations

Primary SOL A.4 The student will solve multistep linear and quadratic equations in two variables, including

- b) justifying steps used in simplifying expressions and solving equations, using field properties and axioms of equality that are valid for the set of real numbers and its subsets;
- d) solving multistep linear equations algebraically and graphically.

Related SOL A.1

Materials

- Algebra tiles
- Colored pencils
- Solving Equations, Using Algebra Tiles activity sheets (attached)
- Graphing calculators

Vocabulary

linear equation, substitution property of equality, addition property of equality, subtraction property of equality, multiplication property of equality, division property of equality (A.4)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Note: Algebra tiles are an excellent way to teach the kinesthetic learner. By drawing representations of the tiles, students make connections between the concrete and the abstract. Encourage the use of different colored pencils for the drawings.

1. Model using algebra tiles to solve multistep linear and quadratic equations in two variables.
2. Distribute colored pencils and copies of the three Solving Equations Using Algebra Tiles activity sheets. Have students solve the equations, drawing the tile models, as guided practice in manipulating equations.
3. Reinforce the use of the field properties of real numbers and the properties of equality in justifying the steps in solving equations.
4. Have students confirm solutions to equations, using their graphing calculators.

Assessment

- **Questions**
 - Draw $2 - x = 2x - 4$ as it would look represented by algebra tiles. Solve the equation by drawing the algebra tile procedures. What properties of equality did you use?
 - Create an equation with $x = 2$. Draw this equation as it would look represented by algebra tiles. Solve the equation by drawing the algebra tile procedures.

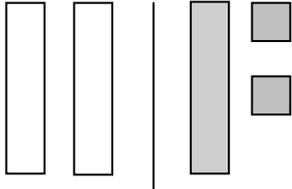
- **Journal/Writing Prompts**
 - One of your classmates was absent when we discussed how to use algebra tiles to solve equations. Write a detailed explanation of this procedure.
- **Other**
 - Demonstrate how to solve $2x + 4 = -6$, using algebra tiles.
 - Have students make presentations explaining how use algebra tiles to solve equations. Encourage them to include properties of equality in their presentations.

Strategies for Differentiation

- Encourage ELL students to write the description of procedures in their native languages.
- Provide students with a word bank for written description of procedures.
- Have students write keywords instead of writing the entire list of procedures.
- Allow students to use actual algebra tiles as templates for tracing.

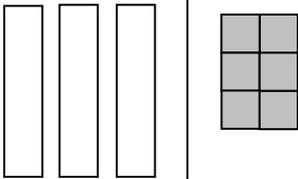
Solving Equations Using Algebra Tiles

Name _____ Date _____

Equation	Tile Model	Written Description of Procedure	Mathematical Procedure (Algorithm)
$x + 2 = 3$			
$2x - 4 = 8$			
$2x + 3 = x - 5$			
			

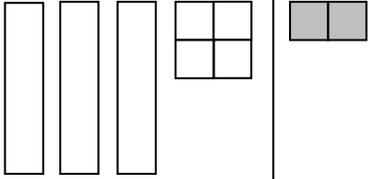
Solving Equations Using Algebra Tiles – Jigsaw Puzzle 1

Name _____ Date _____

Equation	Tile Model	Written Description of Procedure	Mathematical Procedure (Algorithm)
$2x = -8$			
			
		<ol style="list-style-type: none"> 1. One negative x is equal to 5. 2. Take the opposite of each side of the equation. 3. One x is equal to five negative units. 	
			$ \begin{array}{r} 3x = 2 + x \\ \underline{-x} \qquad \underline{-x} \\ 2x = 2 \\ \underline{\div 2} \quad \underline{\div 2} \\ x = 1 \end{array} $

Solving Equations, Using Algebra Tiles – Jigsaw Puzzle 2

Name _____ Date _____

Equation	Tile Model	Written Description of Procedure	Mathematical Procedure (Algorithm)
$2x + 1 = 5$			
			
		<ol style="list-style-type: none"> 1. Three negative xs and two units are the same as 5. 2. Subtract two units from each side of the equation. 3. Divide both sides of the equation into two equal groups. 4. Flip both sides of the equation to make them opposites. 5. One x is equal to one negative unit. 	
			$ \begin{array}{rcl} 2x - 3 & = & x + 2 \\ \underline{-x} & & \underline{-x} \\ x - 3 & = & 2 \\ \underline{+3} & & \underline{+3} \\ x & = & 5 \end{array} $