

Dear Family,

The next Unit in your child's mathematics class this year is ***It's In the System: Systems of Linear Equations and Inequalities***. This Unit was designed to help your child develop an understanding of the ways in which systems of equations and inequalities can be used to model problem situations. Your child will also develop skills in using graphic and algebraic methods to solve these systems.

▶ Unit Goals

In *It's In the System*, students use a contextual and an intuitive approach to develop methods for solving systems. Through this exploration, students will work with linear equations and inequalities and will develop an understanding of how solving a system reveals information related to the problem context.

Students will extend their prior knowledge of linear functions to solving systems by graphing, writing equivalent forms of an equation, and using linear combinations of the system of equations to eliminate one variable.

▶ Homework and Conversations About the Mathematics

In your child's notebook, you can find worked-out examples, notes on the mathematics of the Unit, and descriptions of the vocabulary words. You can help with homework by asking questions such as the following:

- What patterns relate the coordinates of points on a line that has been drawn?
- What patterns relate the points whose coordinates satisfy the equation that is to be solved?
- Does the problem involve an equation or an inequality?
- Does the problem call for writing and/or solving a system of equations?

You can help your child with his or her work for this Unit in several ways:

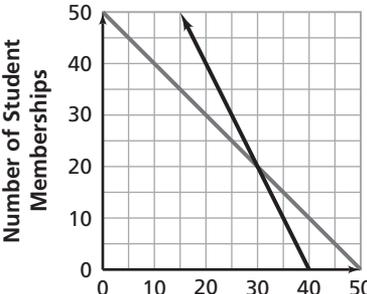
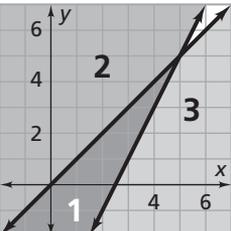
- Talk with your child about the importance of being skillful in algebra.
- Look over your child's homework and make sure all questions are answered and that explanations are clear.
- Have your child pick a question that was interesting to him or her and explain it to you.

▶ Common Core State Standards

Students develop and use all of the Standards for Mathematical Practice throughout the curriculum. In *It's In the System*, particular attention is paid to modeling with mathematics, as students write equations for relationships and analyze the best way to look for appropriate solutions. This Unit focuses largely on the Expressions and Equations domain of the Common Core State Standards, as students analyze and solve pairs of simultaneous linear equations.

A few important mathematical ideas that your child will learn in *It's in the System* are given on the next page. As always, if you have any questions or concerns about this Unit or your child's progress in the class, please feel free to call.

Sincerely,

Important Concepts	Examples
<p>Solving Linear Equations Students have used tables or graphs to find solutions. They can solve simple linear equations, $y = mx + b$ or $mx + b = nx + c$, and simple equations with parentheses, $y = a(x + b)$. In this Unit, students solve equations for different variables symbolically, writing equivalent forms of the equation.</p>	$12x + 3y = 9$ $3y = -12x + 9$ $y = -4x + 3$ <p>(1) Subtract $12x$ from each side of the equation. (2) Divide each side of the equation by 3.</p> $12x + 3y = 9$ $4x + y = 3$ $y = 3 - 4x$ $y = -4x + 3$ <p>(1) Divide each side of the equation by 3. (2) Subtract $4x$ from each side of the equation. (3) Rearrange the order of terms.</p>
<p>Solving Linear Inequalities Solving an inequality is very similar to solving a linear equation. The rules for operations with inequalities are identical to those for equations, with one exception. When multiplying (or dividing) an inequality by a negative number, you must reverse the direction of the inequality sign.</p>	$5x + 7 \leq 42$ $5x \leq 35$ $x \leq 7$ <p>Solving this inequality is similar to solving $5x + 7 = 42$. The operations (+, -, ×, ÷) are applied to each side of the inequality. You usually show this solution on a number line.</p>  $-5x + 7 \leq 42$ $-5x \leq 35$ $x \geq -7$ <p>Reverse the direction of the inequality sign.</p> 
<p>Solving Systems of Linear Equations There are three standard methods for solving a system of linear equations.</p> <p>The graphing method involves producing straight-line graphs for each equation and then reading coordinates of intersection points as the solution(s).</p> <p>The linear combination method relies on two basic principles: (1) If one of the equations is replaced by a new equation formed by adding the two original equations, the solution is unchanged. (2) The solutions of any linear equation $Ax + By = C$ are the same as the solutions of $KAx + KBy = KC$, where K is a nonzero number.</p> <p>The equivalent form method is the process of rewriting the equations in $y = ax + b$ form and then setting the two expressions for y equal to each other.</p>	 <p>The intersection point has coordinates (30, 20), so the solution of the system is $x = 30$ and $y = 20$.</p> $\begin{cases} 3x + 5y = 8 \\ 6x + y = 7 \end{cases}$ is equivalent to $\begin{cases} -6x - 10y = -16 \\ 6x + y = 7 \end{cases}$ Adding the two equations gives $-9y = -9$. The solution is $y = 1$ and $x = 1$. $\begin{cases} 2x + y = 5 \\ 9x - 3y = 15 \end{cases}$ is equivalent to $\begin{cases} y = -2x + 5 \\ y = 3x - 5 \end{cases}$ Since $y = y$, $-2x + 5 = 3x - 5$. The solution is $x = 2$ and $y = 1$.
<p>Solving Systems of Linear Inequalities Systems of inequalities tend to have infinite solution sets. The solution of a system of distinct, nondisjoint linear inequalities is the intersection of two half-planes, which contain infinitely many points.</p>	<p>In general, there are four regions suggested by a system of linear inequalities such as the following: $\begin{cases} y \leq x \\ y \geq 2x - 5 \end{cases}$</p>  <p>Region 1 contains the solutions to the system. Points in Regions 2 and 3 satisfy one, but not both, of the inequalities. The fourth region satisfies neither inequality.</p>