**Solving Systems of Linear Inequalities by Graphing**

**Grade Level and Subject:**
Grades 10/11 Algebra 2 (40 minute class period)

**Instructional Objectives:**
1. Students will be able to solve linear systems of inequalities by graphing.

**Concepts Addressed/Related Content Standards or Framework:**
Concepts
Solving systems of linear inequalities by graphing, classifying systems of inequalities, analyze systems of linear inequalities

PDE Standards
2.8.11.D Formulate expressions, equations, inequalities, systems of equations, systems of inequalities and matrices to model routine and non-routine problem situations.
2.8.11.F Identify whether systems of equations and inequalities are consistent or inconsistent.
2.8.11.G Analyze and explain systems of equations, systems of inequalities, and matrices.

NCTM Standards
1. Write equivalent forms of equations, inequalities, and systems of equations and solve them with fluency—mentally or with paper and pencil in simple cases and using technology in all cases.
2. Interpret representations of functions of two variables.
3. Recognize and apply mathematics in contexts outside of mathematics.

**Materials Required:**
1. Pencils and paper
2. Textbook – *Algebra 2* Prentice Hall 2004 Edition
3. Graph paper
4. Smartboard
5. Mac laptop with Grapher program
6. Projector (projecting onto Smartbord with Mac Laptop)

**Engagement:**
Work on the warm-up problem on the blackboard.

**Procedure:**
1. Collect projects while students work on warm-up problem. (10 minutes).
2. Discuss with the class the results from the warm-up problem using the Grapher Program. Use the Grapher program to shade the 1$^{st}$ equation in blue and the second in red. The overlapping purple shaded area will be the solution. (10 minutes)
3. Students work on graphing the following system of inequalities on graph paper in their groups. (This is done by hand because students need to be able to understand/apply the

concept on their own.) (5 minutes):

$$\begin{cases} x - 2y < 6 \\ y \leq -\left(\frac{3}{2}\right)x + 5 \end{cases}$$

4. Discuss with the class the results of the problem in #3 using the Grapher Program. Is (0,2) a solution of the system?(5 minutes)

5. Students work on graphing the following system of inequalities in their groups (5 minutes):

$$\begin{cases} y \geq x + 2 \\ 3y < 3x - 3 \end{cases}$$

6. Discuss with the class the results of the problem in #3 using the Grapher program. Is there a solution to the system?( (3 minutes)

7. Closure and assign HW problems. (2 minutes)

**Key Discussion Questions:**

1. What are we doing when we solve systems of linear equalities?
2. When graphing, where is the solution in a system of linear equalities? How do you know?
3. How do you determine if a point is a solution to a system of linear equalities? Is there more than one way to tell?

**Closure:**

1. How can we solve a system of linear inequalities?
2. Assign homework problems.

**Assessment:**

See Procedure section #2,4, 6 for in class assessment. Also monitor students as they are working in groups.

HW: pp.132 #2, 3, 5, 10-15, 16

**Extension Activities:**

Word problem #17 on page 132.

**Warm-up Problem**

Graph the system of inequalities (hint, just graph each inequality):

$$\begin{cases} y \leq 2x + 2 \\ y < -x + 1 \end{cases}$$

What do you think the solution is?