Graphing Linear Inequalities 8th or 9th Grade Algebra

LISA OVER

Big Idea

- Connect prior knowledge of graphing inequalities and linear equations to graphing linear inequalities
- Compare and contrast linear inequalities where the direction of the inequality and/or the sign of the slope differ (Hands-on activity)
- Develop a procedure to determine what portion of the graph to shade

Objectives

Students will be able to …

- Correctly graph and solve linear inequalities in two variables 8 out of 10 times.
- Correctly demonstrate an understanding of the vocabulary *linear inequality* and *solution of a linear inequality* 8 out of 10 times.

PA State Standards

- Anchor Descriptor - A1.1.3.2 Write, solve and/or graph systems of linear inequalities using various methods.
- Eligible Content - A1.1.3.2.1 Write and/or solve a system of linear inequalities using graphing (limit systems to 2 linear inequalities).

Common Core Standards

- CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships.
- CC.2.2.HS.D.9 - Use reasoning to solve equations and justify the solution method.
- CC.2.2.HS.D.10 - Represent, solve, and interpret equations/inequalities and systems of equations/ inequalities algebraically and graphically.

Rationale for Students

- Present various real-life scenarios to students so they connect what they will learn in this lesson to real-life.
  - The German club is having a bake sale and needs to raise $250. If they sell German chocolate cupcakes for $3.00 each and packs of two Pfeffernuesse cookies for $2.00 each, how many of each do they need to sell to raise at least $250?
  - Jacqueline wants to spend no more than $37 while stocking up on ice cream and chocolate sauce. Ice cream costs $5 per carton and chocolate sauce costs $2 per jar. What combinations of each can she buy without exceeding her budget of $37?

Materials

- 1 smart board and computer with lesson files
- 1 copy: Graphing Linear Inequalities Pattern Activity (teacher's version)
- 24 copies: Graphing Linear Inequalities Pattern Activity Worksheet
- Colored Pencils
- 12 copies: Graphing Linear Inequalities Partnership Solution Worksheet OR iPad/laptop
- 24 copies: Graphing Linear Inequalities Homework Choice Board

Differentiation

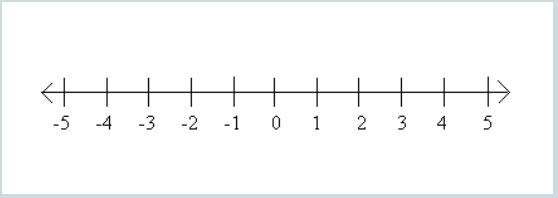
- Students create a visual reference of the pattern of shading four basic linear inequalities.
- Students work in pairs meeting the following criteria:
  - *Two different ability levels are represented within each partnership*
  - *The ability levels of each student in any partnership are not so extremely different to inhibit the learning of either or both students*
- Homework consists of a choice board from which students select problems to accumulate 25 points.

Technology

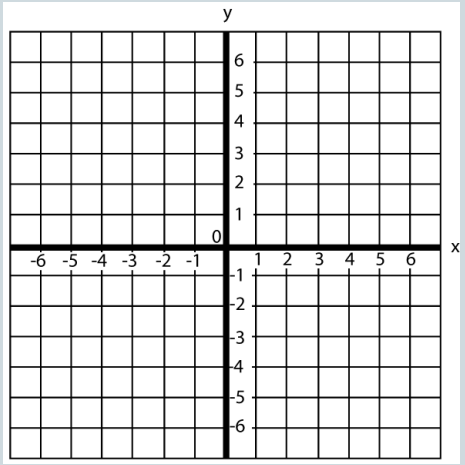
- Smart board
- iPad/laptop with drawing application (optional)

Anticipatory Set

- Activate prior knowledge
  - Graphing inequalities on a number line
  - Graphing linear equations

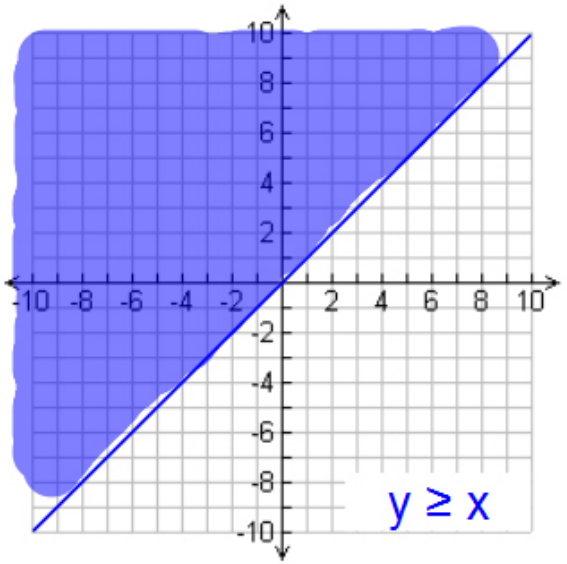


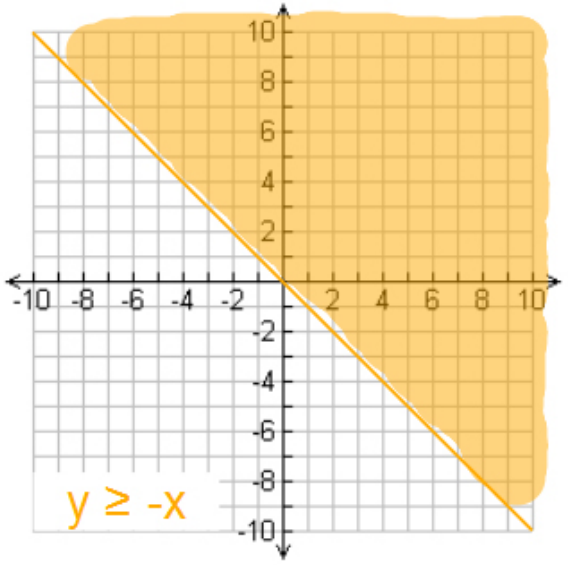
- Graph the inequalities
  - $x \leq 4$
  - $x > -2$
- Graph the linear equations
- $y = x + 4$
- $y = -2x - 3$

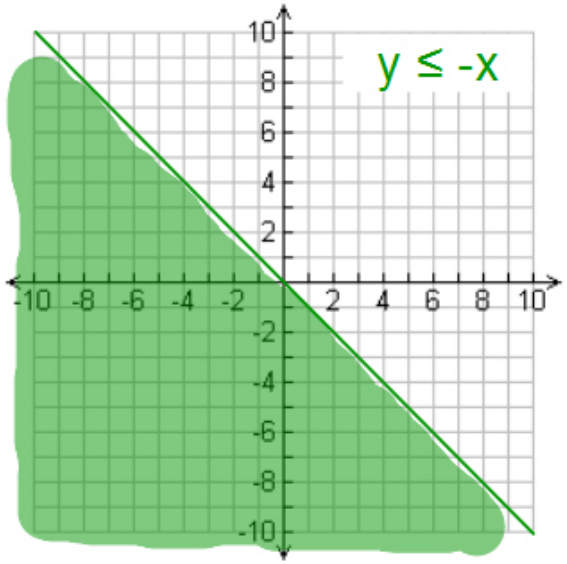


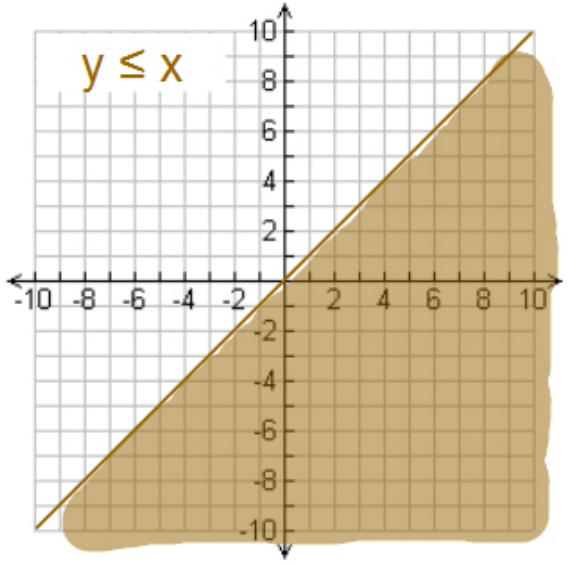
Procedure: Instruction and Activity

- Connect the new concept to student's prior knowledge of graphing inequalities and of graphing linear equations.
- Create a visual reference and develop a procedure that will support them when graphing independently.
- Illustrate examples of more complex linear inequalities.


y ≥ x


y ≥ -x


y ≤ -x


y ≤ x

Procedure: Collaborative Group Work

- Students work in heterogeneous pairs to…
  - Solve a linear inequality on a large paper with a coordinate plane or on a computer drawing application.
  - Outline the steps and decision process they took to solve the inequality.
- Teacher circulates during this group work to encourage students and to guide and/or redirect.

Exit Activity

- Each group takes a turn to pin the work on the board and to explain their process and solution to the class.
  - If students use technology to create an image, students add their work to a shared presentation file.
- If time is an issue, new groups of 4-6 students can provide a way for multiple students to share simultaneously.

Homework

- Several problems in the form of a choice board
- Problems are either 3 points, 5 points, or 7 points, depending on the level of difficulty.
- Students select problems to accumulate 25 points.
- Students will have to select at least two moderate or one hard problem.
  - Basic – 6 problems worth 3 points
  - Moderate – 4 problems worth 5 points
  - Hard – 4 problems worth 7 points