

## Border Patrol

ID: 11602

 Time required  
*20 minutes*

## Activity Overview

*In this activity, students will graph one linear inequality and then graph a system of linear inequalities as they apply to an area of land. Students will practice graphing systems of inequalities and determining if a points lies in the solution. In the extension, students are challenged to write a system of inequalities that describe the area of Mississippi.*

## Topic: Linear Systems

- *Linear inequalities in two variables*
- *Solution sets*

## Teacher Preparation and Notes

- *The teacher should introduce and practice graphing an inequality before using the activity.*
- ***To download the student worksheet, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter "11602" in the keyword search box.***

## Associated Materials

- *BorderPatrol\_Student.doc*

## Suggested Related Activities

*To download any activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the keyword search box.*

- *Solving Linear Equations and Inequalities (TI-Nspire technology) — 8992*
- *Winning Inequalities Part 1 (TI-84 Plus family) — 4283*
- *The Impossible Task (TI-84 Plus family) — 9316*

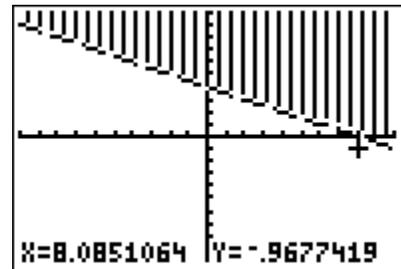
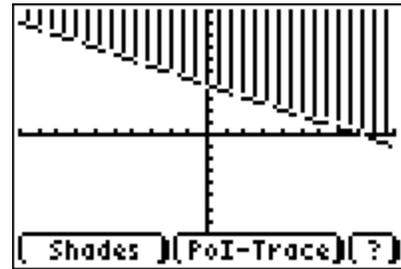
**Problem 1 – Graphing one inequality**

Students are to graph an inequality that represents United States territory along the US/Mexico border. Directions for graphing the inequality are provided on the student worksheet.

To answer the questions, students can use the arrow keys on the calculator to move to different locations on the graphing window.

Discussion Questions:

- Why does line appear dotted?
- How can one determine if the calculator has shaded the plane correctly?
- Can a town lie on the border and be considered in US territory?



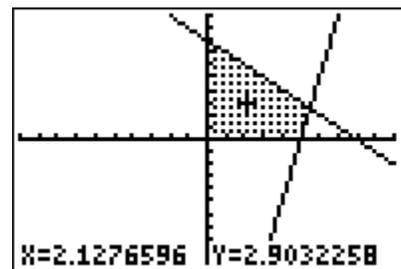
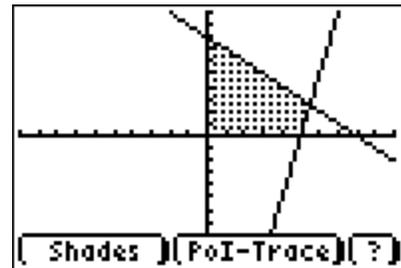
**Problem 2 – Graphing a system of linear inequalities**

Students are given a system of inequalities that represent a fenced-in yard.

Students should see that the lines are solid because the fence is the owner's property and the inequality symbols are  $\leq$  and  $\geq$ .

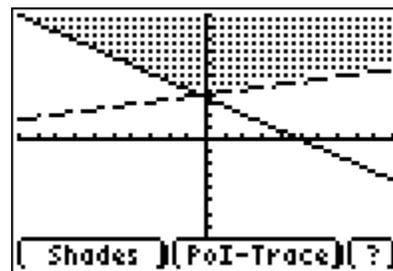
Once the students have press  $\boxed{\text{ALPHA}}$   $\boxed{\text{F2}}$  and select **Ineq Intersection**, they will see the screen to the right displaying the fundamental region.

They will need to use the arrow keys on the calculator to move to a location within the yard for the bird feeder.



**Problem 3 – Practice graphing systems of inequalities**

Students will graph systems of linear inequalities given on the student worksheet page. They are to graph the systems and then determine if the points given below the graph are in the solution set. To do this, they can either use the arrow keys, or determine if the point satisfies both inequalities by using the calculator ability of their handheld.

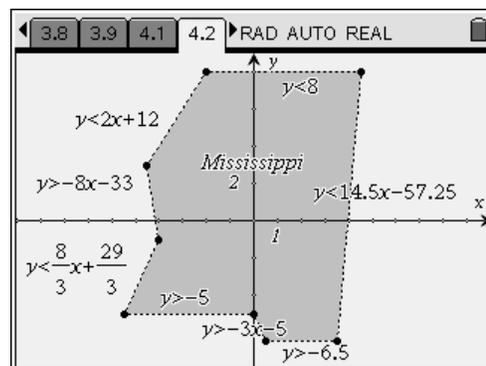


Discussion Questions:

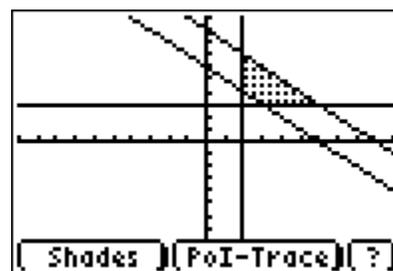
- How can we determine the solution set by examining the graph?
- Is there a way to describe the solution set using non-graphical notation?

**Extension – Writing a system of linear inequalities**

In the first extension, students are given a graph of the shape of the state of Mississippi. They are to determine the system of linear inequalities that describe the area of the state. The inequalities should have  $<$  or  $>$  because the borders are imaginary.



In the second extension, students are given a word problem from which they will write a system of linear inequalities. They can graph the system on page 4.4. One of the constraints is  $x > 2$ . Students can add a vertical line at  $x = 2$  and place text on the screen notifying that there is that constraint.



Students must then determine which of the combinations of juniors and seniors listed on are possible solutions to the problem.

Answers:

- 3 juniors, 5 seniors
- 4 juniors, 4 seniors

System of inequalities:

$$\begin{cases} x \geq 2 \\ y \geq 3 \\ y \leq -x + 9 \\ y \geq -x + 6 \end{cases}$$