

Graphing Technology Lab

Systems of Inequalities

TI-84 Plus

You can use a TI-84 Plus to explore systems of inequalities.

ACTIVITY Graph Systems of Inequalities

Mr. Jackson owns a car washing and detailing business. It takes 20 minutes to wash a car and 60 minutes to detail a car. He works at most 8 hours per day and does at most 4 details per day. Write a system of linear inequalities to represent this situation.

First, write a linear inequality that represents the time it takes for car washing and car detailing. Let x represent the number of car washes and let y represent the number of car details. Then $20x + 60y \leq 480$.

To graph this using a graphing calculator, solve for y .

$$20x + 60y \leq 480$$

Original inequality

$$60y \leq -20x + 480$$

Subtract $20x$ from each side and simplify.

$$y \leq -\frac{1}{3}x + 8$$

Divide each side by 60 and simplify.

Mr. Jackson does at most 4 details per day. This means that $y \leq 4$.

Clear the calculator memory and set the viewing window before you start graphing.

KEYSTROKES: $\boxed{2\text{nd}} \boxed{[\text{MEM}]} \boxed{7} \boxed{:\text{Reset}} \boxed{1} \boxed{:\text{All RAM}} \boxed{2} \boxed{:\text{Reset}} \boxed{[\text{WINDOW}]} \boxed{(\leftarrow)} \boxed{2} \boxed{[\text{ENTER}]} \boxed{30}$
 $\boxed{[\text{ENTER}]} \boxed{2} \boxed{[\text{ENTER}]} \boxed{(\leftarrow)} \boxed{10} \boxed{[\text{ENTER}]} \boxed{10} \boxed{[\text{ENTER}]}$

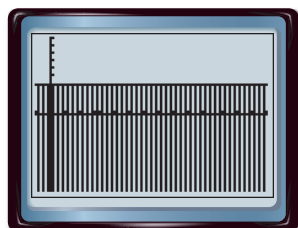
Step 1 Graph $y \leq 4$.

KEYSTROKES: $\boxed{Y=}$ $\boxed{4}$ $\boxed{\leftarrow}$ $\boxed{\leftarrow}$ $\boxed{\leftarrow}$
 $\boxed{[\text{ENTER}]} \boxed{[\text{ENTER}]} \boxed{[\text{ENTER}]}$

On the left side of Y_1 , the flashing icon should show shading below the line for \leq .



Press $\boxed{[\text{GRAPH}]}$ to graph $y \leq 4$.

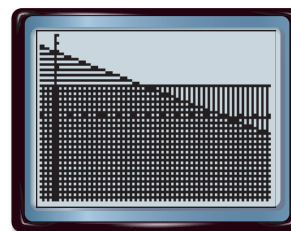


$[-2, 30]$ scl: 2 by $[-10, 10]$ scl: 1

Step 2 Graph $y \leq -\frac{1}{3}x + 8$.

KEYSTROKES: $\boxed{Y=}$ $\boxed{\nabla}$ $\boxed{(\leftarrow)}$ $\boxed{(}$ $\boxed{1}$ $\boxed{\div}$ $\boxed{3}$ $\boxed{)}$
 $\boxed{X,T,\theta,n}$ $\boxed{+}$ $\boxed{8}$

Change to less than or equal to as you did in Step 1, then $\boxed{[\text{GRAPH}]}$.



$[-2, 30]$ scl: 2 by $[-10, 10]$ scl: 1

The darkest shaded half-plane of the graph represents the solutions.

Analyze the Results

1. If Mr. Jackson charges \$75 for each car he details and \$25 for each car wash, what is the maximum amount of money he could earn in one day?
2. What is the greatest number of car washes that Mr. Jackson could do in a day? Explain your reasoning.