10 - Solving Inequalities by Graphing.docx

Thursday, February 13, 2020   10:17 AM

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4.8

SOLVING LINEAR AND QUADRATIC INEQUALITIES GRAPHICALLY

How do we read these inequalities (from left to right?) $5 > 2$ $-3 < 1$

5 is greater than 2   -3 is less than 1

What does each symbol mean? $>$ $<$ $\geq$ $\leq$

greater than   less than   greater than or equal to   less than or equal to ✓

How do you say this aloud? $x \geq 4$

What is the primary difference between an **equation** and an **inequality**?

An equation has one (or two) solutions, an inequality has a whole range of solutions.

A single-variable ___linear inequality___ is an inequality where one side of the inequality is a ___linear expression___ and the other side is a ___constant___ or ___linear expression___.

slope $\left(\frac{y}{x}\right)$

Example 1

linear think $y = mx + b$ ← y-int.

Solve the following inequality graphically

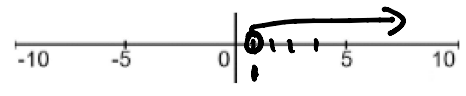| Solve: $3x - 1 > 2$	Graph $3x - 1 > 2$
Graph $\boxed{y = 3x - 1}$ $m = 3$ y-int = -1	
$y = 2$	
where is $y = 3x - 1$ above $y = 2$	
points $(1, 2)$	solutions
$3x - 1 < 2$	
$x < 1$	
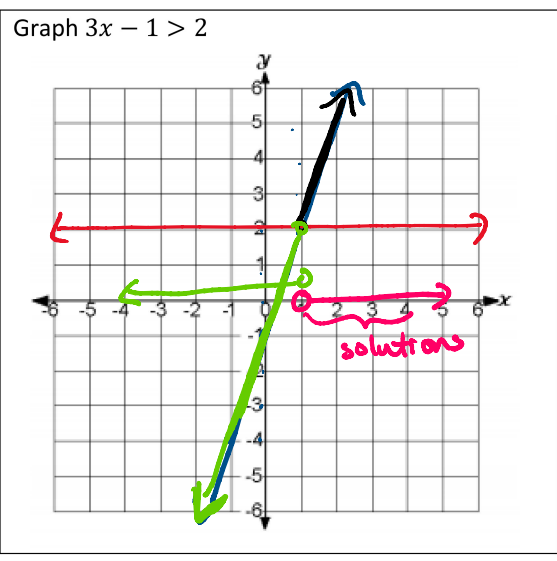
b) Write your solution $x > 1$
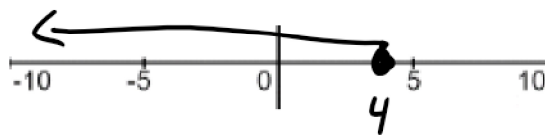
c) graph the solution on a number line

Example 2

Solve the following inequality graphically

	Graph :
Rearrange $\frac{1}{2}x - 1 \leq -x + 5$ $+x \qquad +x$ $\frac{3}{2}x - 1 \leq 5$ $\frac{3}{2}x - 6 \leq 0$ graph $y = \frac{3}{2}x - 6$ $\qquad y = 0$ $\qquad\qquad\qquad$ (x-axis) where is the graph $y = \frac{3}{2}x - 6$ below $y = 0$ or the x-axis?	

b) Write your solution

$$x \leq 4$$

c) Graph the solution on a number line

4

c) Check your answer Use a test point from your graph, substitute into the original equation.

Try $x = 4$ $\qquad \frac{1}{2}(4) - 1 \leq -(4) + 5$
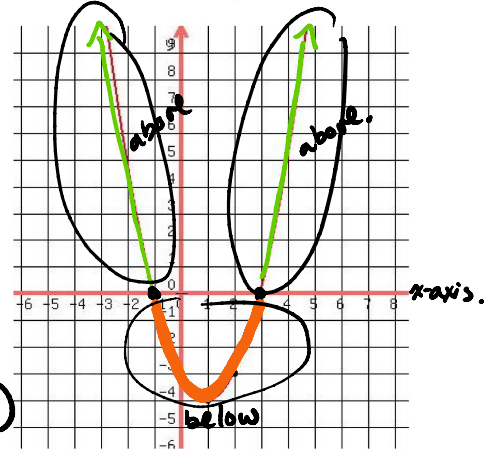
$$1 \leq 1 \checkmark \text{True!}$$

inequality works!

SOLVING QUADRATIC INEQUALITIES BY GRAPHING

Example 3

Use the quadratic function $f(x) = x^2 - 2x - 3$ and its graph to answer the following:

a) Solve $x^2 - 2x - 3 = 0$

b) Solve $x^2 - 2x - 3 < 0$ and graph on a number line

c) Solve $x^2 - 2x - 3 > 0$ and graph on a number line

From the graph, you can see the parabola has
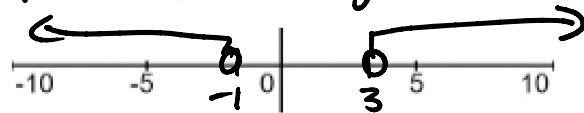
x-intercepts at ____ -1 ____ and ____ 3 ____. (on x-axis)

a) Therefore, $\boxed{x^2 - 2x - 3 = 0}$ when ____ $x = -1$, $x = 3$ _____

The parabola is BELOW the x-axis when x…. is between -1 and 3

b) Therefore, Solve $x^2 - 2x - 3 < 0$ when ____ $-1 < x < 3$ _____

The parabola is ABOVE the x-axis when x… left of -1   right of 3

c) Therefore, Solve $x^2 - 2x - 3 > 0$ when ____ $x < -1$ and $x > 3$ ____

Example 4 Solve the quadratic inequality
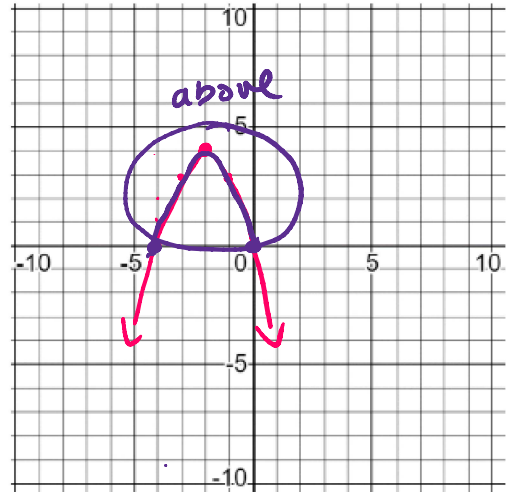
Rearrange $-x^2 - 3x \geq x$	Graph:
$-x^2 - 4x \geq 0$	
graph $y = -x^2 - 4x$	
$y = -(x+2)^2 + 4$	
we are looking at where the graph is above and equal to the x-axis. (intercepts!)	

Graph:

above

we are looking at where the graph is above and equal to the x-axis.

a) Write your solution   our intercepts are $x = -4$, $x = 0$

$$-4 \leq x \leq 0$$

b) Graph the solution on a number line

(number line from -10 to 10, closed dots at -4 and 0 with segment between)

-4
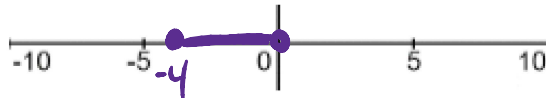
c) Check your solution: Test point!

Try 0.

$$-(0)^2 - 3(0) \geq 0$$

$$0 \geq 0 \checkmark \text{ True.}$$

Assignment.
· p.355 #3-6 (workbook)
· practice worksheet.