

4-8 Graphing & Solving Quadratic Inequalities

- solve quadratic inequalities in two variables.
- solve quadratic inequalities in one variable.
- A.CED.1, A.CED.3

In Two Variables

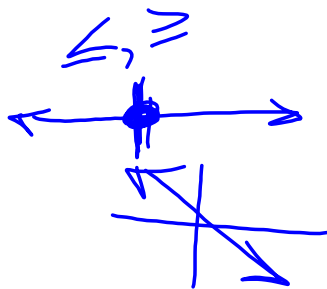
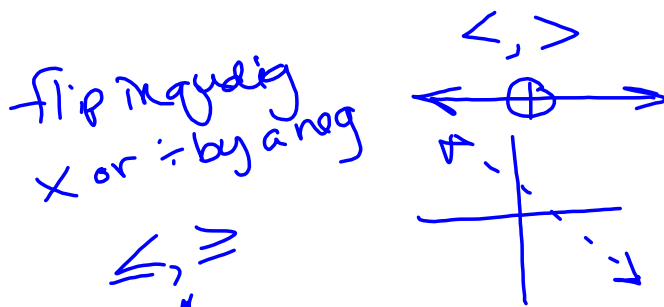
- graph the related quadratic function. \leq, \geq $<, >$
- determine if the parabola should be solid or broken.
- test a point NOT on the parabola - shade true.

$$y = ax^2 + bx + c$$

$V\left(\frac{-b}{2a}, -\right)$
 $y\text{-int } (0, c)$

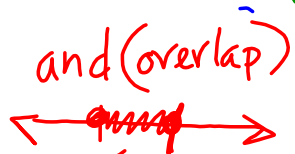
$$y = a(x-h)^2 + k$$

$V(h, k)$



$$y = mx + b$$

$m = \text{slope}$
 $b = y\text{-int}$



or (or everything)

$$\{x \mid a < x < b\}$$

~~and~~

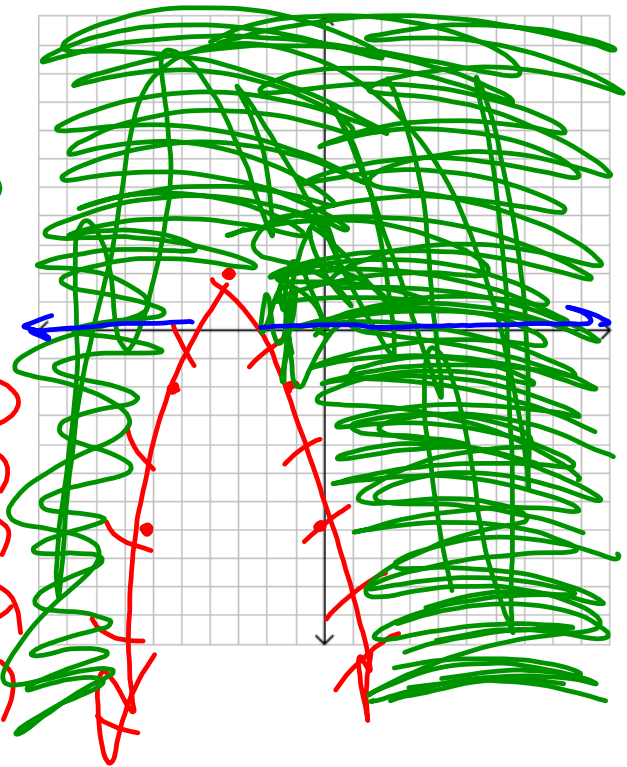
$$\{x \mid x < a \text{ or } x > b\}$$

Examples - graph the following quadratic functions.

1. $y > -x^2 - 6x - 7$

$y = -x^2 - 6x - 7$
 $y = -1(x^2 + 6x + 9) - 7 + 9$
 $y = -1(x+3)^2 + 2$

x	y
-6	-7
-5	-2
-3	2
-1	2
0	-7



\leq

no more than
at most
maximum

\geq

no less than
at least
minimum

Examples - graph the following quadratic functions.

2. $y \geq x^2 - 3x + 2$ $\frac{9}{4} - \frac{9}{2} + 2$ $(x-2)(x-1) = 0$ $0 \neq 2$

$f = x^2 - 3x + 2$ $\frac{-9}{4} + \frac{8}{4}$ $x-2=0$
 $x-1=0$

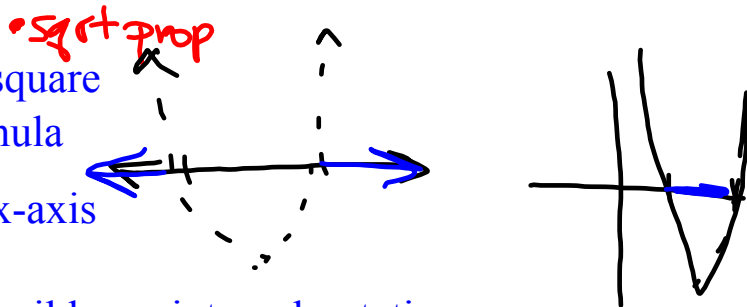
$y = \frac{-b}{2a} = \frac{3}{2} = 1.5$ $x=2$
 $x=1$

$16 - 12 + 2 = 4 + 2$

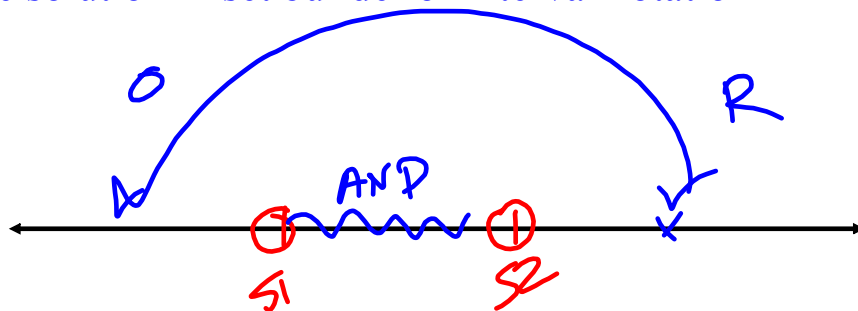
x	y
-1	6
0	2
1	0
2	0
3	2
4	6

In One Variable (only concerned with the solutions on the x-axis)

- Solve the quadratic equation - find the zeros
 - graph
 - factor
 - complete the square
 - quadratic formula



- Plot the zeros on the x-axis
- Check a point
- Write solution in set builder or interval notation



Examples - Solve the following quadratic inequalities.

3. $x^2 + 9x + 14 < 0$ $14 < 0$

$x^2 + 9x + 14 = 0$

$(x+2)(x+7) = 0$

$x+2=0$ $x+7=0$

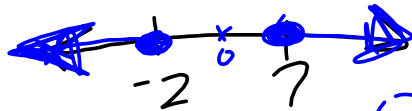
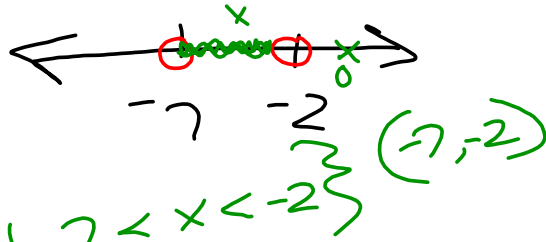
$x=-2$ $x=-7$

4. $(x-7)(x+2) \geq 0$

$(x-7)(x+2) = 0$

$x-7=0$ or $x+2=0$

$x=7$ $x=-2$



$\{x \mid x \leq -2 \text{ or } x \geq 7\}$

$(-7)(2) = 14 \neq 0$

$21 \pm \sqrt{3}$

When only 1 solution - Solutions will be as follows:

- no solution
- all reals
- just the point.
- everything except the point.

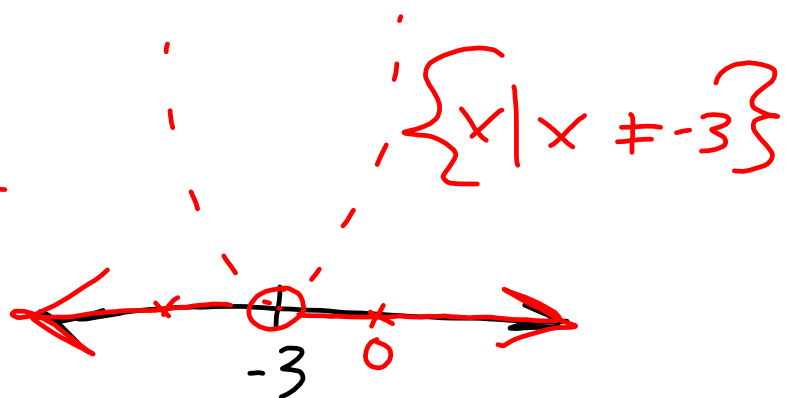
Example

5. $x^2 + 6x + 9 > 0$

$\sqrt{(x+3)^2} \neq 0$

$x+3 \neq 0$

$x \neq -3$



$a > 0$

4-8 Worksheet evens only

