# Math-2A
# Lesson 6-7
# Solving Quadratic Inequalities

# Quadratic Equation Review $y = x^2 - x - 12$

What does the "solution" mean?

"All (x, y) pairs that make the equation true."

What does the graph of the "solution" look like?

"A U-shaped curve called a parabola."

$$y = x^2 - x - 12$$

What are the zeroes of the equation?

$$0 = x^2 - x - 12$$

Set y = 0

Convert the standard form quadratic into intercept form.

$$0 = (x-4)(x+3)$$

Use the <u>Zero Product Property</u> to find the zeroes

$$x = 4, -3$$

Find the zeroes of the equation.

$$y = x^2 - 6x + 8$$

Set y = 0

$$0 = x^2 - 6x + 8$$

Convert into intercept form.

$$0 = (x-4)(x-2)$$

Use the Zero Product Property to find the zeroes

$$x = 4,2$$

$$y = 2x^2 + 10x - 28$$

Set y = 0

$$0 = 2x^2 + 10x - 28$$

Convert into intercept form.

$$0 = 2(x^2 + 5x - 14)$$

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

Use the Zero Product Property to find the zeroes

$$x = -7,2$$

# Inequality Review

Simple Inequality:

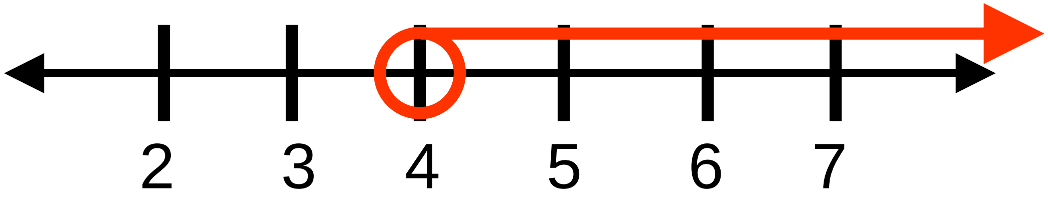
$$x - 1 > 3$$

+1 +1 Addition Property of Inequality

$$x > 4$$

$$x = 4$$ The <u>equation</u> gives the <u>*boundary number*</u>

Is the <u>*boundary number*</u> solid or circled?




Pick a number and check to see if it is a solution. Let's pick '5'

$$(5) > 4$$

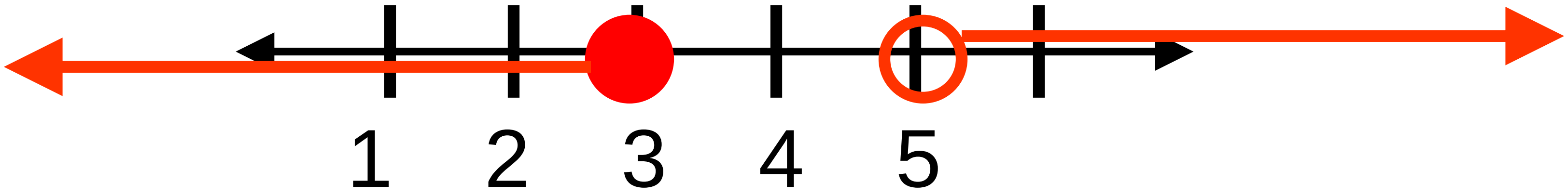
'5' is a solution, shade the '5' and all other numbers on that side of the boundary number.

# What is this called?

$x \leq 3$ or $x > 5$

Compound inequality: 2 inequalities joined together by the either "**and**" or "**or**".

What does the graph of the inequality look like?




*Notice* that the boundary numbers separate the numbers that ARE solutions of the inequality from the numbers that are NOT solutions.

$0 > x^2 - 3x - 10$ $\quad$ $0 = x^2 - 3x - 10$

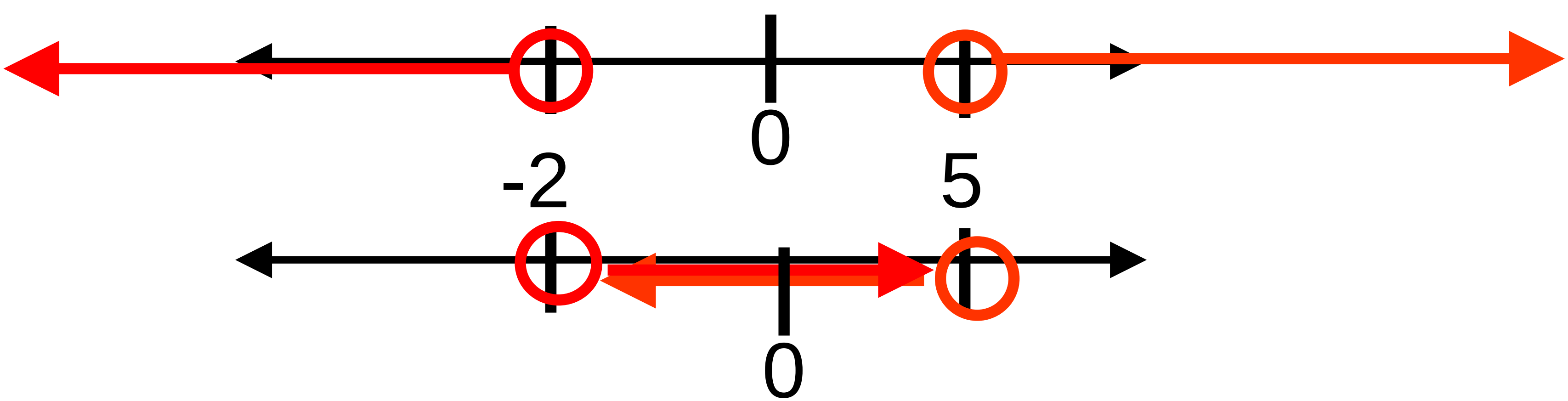
Find the boundary numbers → <u>Solve the equation</u>:

$0 = (x + 2)(x - 5)$ $\quad$ $x = -2, 5$

Are the ***boundary numbers*** solid or circled?

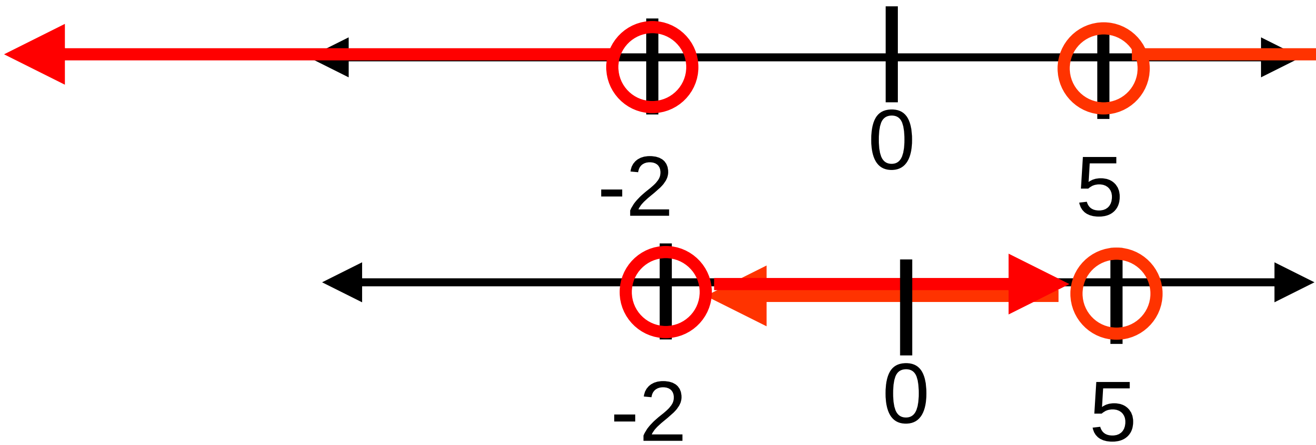

The numbers -2 and 5 divide the solution from the "non-solution."

The solution is <u>one</u> of the two graphs below.



$$0 > x^2 - 3x - 10 \qquad 0 = x^2 - 3x - 10$$

The solution is one of the two graphs below.




$$x = (-2, 5)$$

Pick and easy number to test.

If zero is NOT a solution, the top graph is the solution.

If zero IS a solution, the bottom graph is the solution.

$$0 > (0)^2 - (0) - 10 \qquad 0 > -10$$

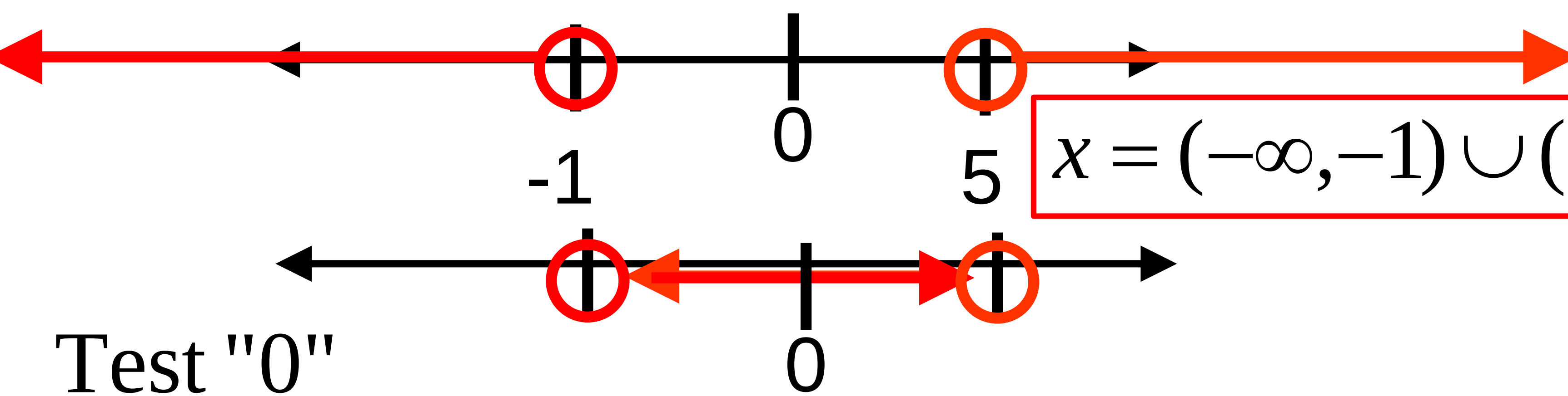
Zero IS a solution, the bottom graph is the solution.

Solve $0 < x^2 - 4x - 5$ $\qquad 0 = x^2 - 4x - 5$

Find the boundary numbers → Solve the equation:

$0 = (x - 5)(x + 1) \qquad x = 5, -1$


The numbers -1 and 5 divide the solution from the "non-solution."




$x = (-\infty, -1) \cup (5, \infty)$

Test "0"

$0 < (0)^2 - 4(0) - 5 \qquad 0 < -5$

False → shade outside

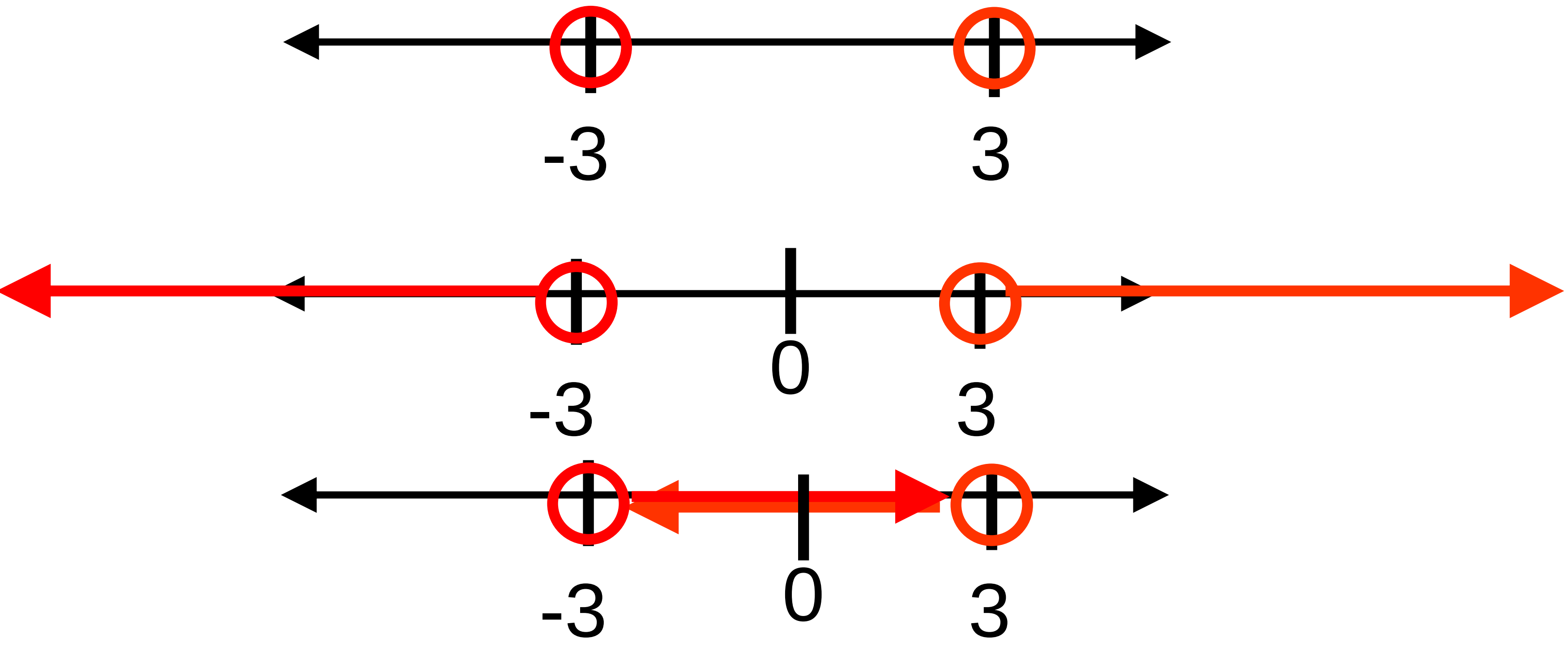
Solve $x^2 - 9 > 0$

Solve the equation: $x^2 - 9 = 0$

$(x - 3)(x + 3) = 0$

x = -3, 3

The numbers -3 and 3 divide the solution from the “non-solution.”




Test "0"

$(0)^2 - 9 > 0$

$-9 > 0$

False → shade outside

$(-\infty, -3) \cup (3, \infty)$

# Another way to look at it:

What does *f(x)* mean?

"math being done to 'x'"

$$f(x) = \underbrace{x^2 - x - 12}$$

Quadratic Inequality

$$x^2 - x - 12 < 0$$

"math being done to 'x'"

$$f(x) < 0$$

*"Where is the function negative?"*

## Quadratic Inequality

$$\underbrace{x^2 - x - 12}_{f(x)} < 0$$

*"Where is the function negative?"*

$$f(x) < 0$$

→ Graph the function using the following steps.

1. Replace "<" or ">" or "≥" or "≤" with the equal sign "=".

$$x^2 - x - 12 = 0$$

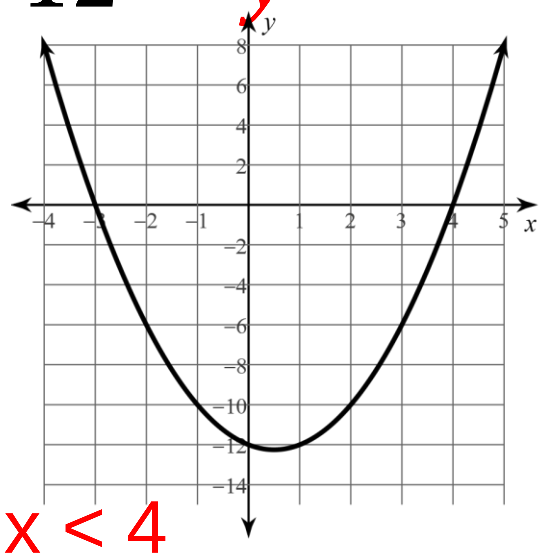
2. Replace "0" with "y" $\quad x^2 - x - 12 = y$

3. Find the x-intercepts (by factoring).

$$y = (x-4)(x+3)$$

4. Graph the function.

5. Where is the function negative?




$$f(x) < 0 \; on \; x = (-3, 4)$$

-3 < x < 4