

NOTES: SECONDARY 2 HONORS  
**UNIT 6 – POLYNOMIAL INEQUALITIES**

**STARTER**

<p>1. Factor  <math>f(x) = 9(x+3)^2 - 121</math></p>	<p>2. Solve for x. Graph your solution on a number line.  <math>4 \leq x + 2 \leq 8</math></p>	<p>3. Solve for x. Graph your solution on a number line.  <math>8 - t &lt; 7</math> or <math>8 - t &gt; 2</math></p>
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Vocabulary:

- **Compound Inequalities:** Two inequalities that are combined into one statement by the word \_\_\_\_\_ or \_\_\_\_\_. The word \_\_\_\_\_ implies that values must satisfy each statement. The word \_\_\_\_\_ implies that values may satisfy either statement.

We did two examples of “normal” cases in the starter (#2 and #3). Now let’s look at some special cases.

$x > 2$ and $x > 5$	
$x > 2$ or $x > 5$	
$x \geq -2$ and $x < 5$	
$x < 3$ and $x > 5$	

## POLYNOMIAL INEQUALITIES

**STEP 1:** Set the polynomial equal to zero and solve.

There are five methods used to solve a **quadratic**. They are:

- 1.
- 2.
- 3.
- 4.
- 5.

Note: It does not matter which of the five methods you use. Sometimes some will be either than others.

**STEP 2:** Draw a number line (representing the x-axis) and mark your zeros. **RECALL:** the zeros are the x-intercepts on the graph.

**STEP 3:** Complete the sign graph for the function. Determine if the expression is positive or negative around each zero. Select a value in the interval and *evaluate* the expression at that value. Then, decide if the result is positive or negative.

**STEP 4:** Determine your answer and write your solution in interval notation.

**STEP 5:** *Check* your answer with the graph of the quadratic.

Example:

1. Solve  $x^2 - 2x - 3 > 0$ .                      Am I looking for "positive" or "negative"?

2. Solve  $-3x^2 - 5x - 2 \leq 0$ .                      Am I looking for "positive" or "negative"?

3. Solve  $x^2 - 3x \leq 4$ .                      Am I looking for "positive" or "negative"?

Example:

A rocket is launched with an initial velocity of 160 ft. /sec from a 4 foot high platform. How long is the rocket at least 260 feet? (Use  $h(t) = -16t^2 + v_0t + h_0$ )

## RATIONAL INEQUALITIES

You can solve rational inequalities the same way, except we also have to consider where the function is **undefined** as well as the **zeros**.

1. How do you find where a rational function is undefined?

2. How do you find the zeros of a rational function?

Example:

1. Solve  $\frac{2}{x+4} \leq 0$ .

Am I looking for “positive” or “negative”?

2. Solve  $\frac{x+3}{2x-5} \geq 0$ .

Am I looking for “positive” or “negative”?