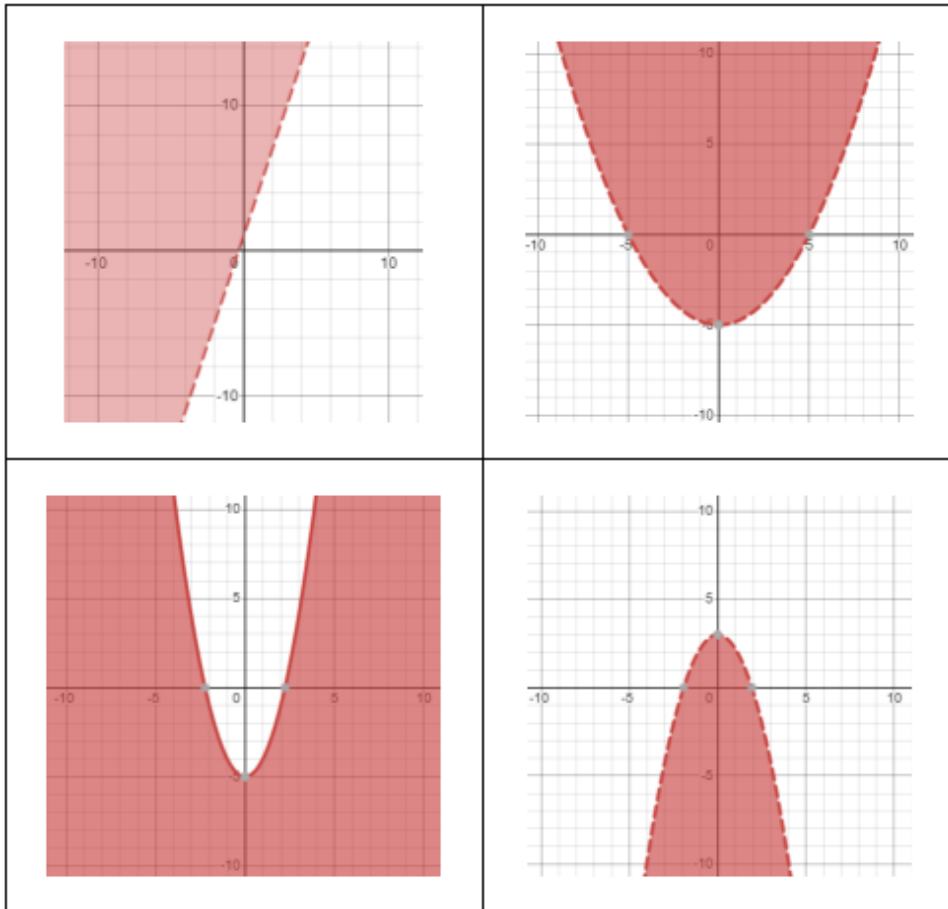Name: _____ Date: _____ Period: _____

_____ **Quadratic Inequalities**

Engage: Which One Doesn't Belong?

Which one do you think doesn't belong? Why?
(Remember, there are no wrong answers as long as you explain your reasoning.)

*Explore: Quilting Quadratics*

Lila is making a large blanket that needs to cover **at least 132 square feet**. The blanket needs to be one foot longer than it is wide. What do the dimensions (length and width) of her blanket need to be? Prove your answer in more than one way (i.e.: graphs, number lines, equations/inequalities).

Mini-Lesson: Graphing Two-Variable Quadratic Inequalities

1. Given the quadratic inequality, $y < 2x^2 - 3x + 1$, sketch the graph of the inequality on the coordinate plane and identify the solution set.
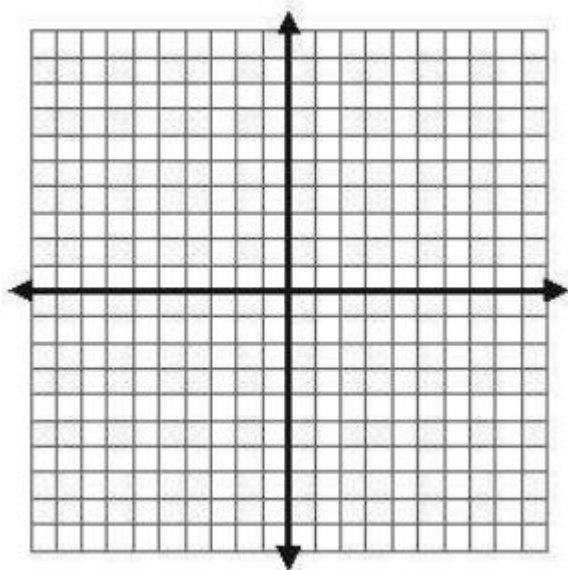
2. Identify the key features of the graph of the inequality $y \geq x^2 - 4x + 3$. How do the features relate to the solutions of the inequality?
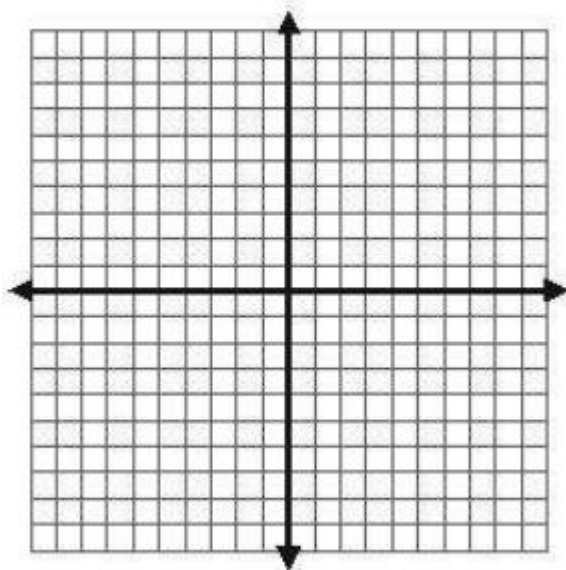
Mini-Lesson: Solving Quadratic Inequalities

3. Solve the quadratic inequality and express the solution set in interval notation.
$$4x^2 - 9x > 5$$

4. Consider the quadratic inequality: $2x^2 + 3x - 4 \leq 0$. Determine the intervals for which the inequality is true and false, and express the solution set in interval notation.

A manufacturer wants to produce a batch of rectangular metal sheets with a fixed perimeter of 40 meters. The manufacturer wants to maximize the area of the metal sheets while using the least amount of material.

However, due to the manufacturing process, the manufacturer has some constraints on the dimensions of the metal sheets. The length must be at least 2 meters longer than the width, and the width must be at least 3 meters. Additionally, the manufacturer has limited resources and can only use a maximum of 50 square meters of metal for each sheet.

Formulate and solve a quadratic inequality to find the dimensions of the metal sheets that will maximize the area while satisfying all the given constraints.

Reflect: Inequality Escapades

Write your responses to the questions in the space below it.

1. Personal Reflection: When you first encountered the problem, how did you feel? Were you confident or uncertain about how to proceed? Did you have any prior knowledge or strategies that you thought might be useful?

2. Problem-Solving Process: Outline the steps you took to solve the problem. Did you correctly interpret the given information and formulate the necessary equations or inequalities? Did you use appropriate mathematical techniques to solve the problem? Explain your reasoning and the choices you made throughout the process.

3. Challenges Faced: Identify any difficulties or challenges you encountered while solving the problem. Did you struggle with any particular step or concept? Did you make any mistakes or encounter obstacles? How did you overcome these challenges? Provide specific examples.

4. Alternative Approaches: Think about alternative approaches or strategies you could have used to solve the problem. Did you consider different problem-solving techniques or perspectives? How might these alternative approaches have influenced your solution or the efficiency of your process?

5. Lessons Learned: Reflect on what you learned from this problem-solving experience. Did you gain any new insights or deepen your understanding of quadratic inequalities or the application of algebra in real-world contexts? Did you learn any general problem-solving strategies that you can apply to other situations? Make connections between the problem and broader mathematical concepts.

6. Future Application: Think about how you can apply the problem-solving skills and strategies you used in this activity to other real-world scenarios. Can you identify any other situations where quadratic inequalities might be useful? How might you approach similar problems in the future?