<table>
<thead>
<tr>
<th>Day</th>
<th>Topic/EQ</th>
<th>Classwork/Homework</th>
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<tbody>
<tr>
<td>Sept. 6th</td>
<td>How do I convert a quadratic from standard form to vertex form? How do I go from vertex to standard?</td>
<td>&quot;Standard form and Vertex Form Conversion&quot; WS</td>
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<tr>
<td>Sept. 7th</td>
<td>How can I describe the characteristics of the graph of a quadratic function? (Domain, Range, extrema, intercepts, zeros, vertex, axis of symmetry)</td>
<td>WS #1</td>
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<td>Sept. 8th</td>
<td>How can I describe the characteristics of the graph of a quadratic function? (Including intervals of increase/decrease and rate of change)</td>
<td>&quot;Rate of Change and Interval of Increase and Decrease&quot;</td>
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<td>Sept. 9th</td>
<td>How can I use of characteristics of functions?</td>
<td>WS #3</td>
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<td>Sept. 12th</td>
<td>How do I graph quadratics as transformations?</td>
<td>&quot;Analyzing Characteristics of Quadratic Graphs&quot;</td>
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<td>Sept. 13th</td>
<td>How do I graph quadratics as transformations?</td>
<td>&quot;Describing Transformations&quot; WS</td>
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<td>Sept. 14th</td>
<td>How can I graph in standard form?</td>
<td>&quot;Graphing by Transformations&quot; WS</td>
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<td>Sept. 15th</td>
<td>How do I graph a quadratic inequality?</td>
<td>&quot;Graphing in Standard Form&quot; WS</td>
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<td>Sept. 16th</td>
<td>How can I solve quadratic inequalities algebraically? (using factoring or quadratic formula?)</td>
<td>&quot;Solving Quadratic Inequalities&quot; WS#6</td>
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<tr>
<td>Sept. 19th</td>
<td>How can I solve quadratic inequalities algebraically? (using factoring or quadratic formula?)</td>
<td>Practice Quiz*</td>
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<tr>
<td>Sept. 20th</td>
<td>What have I learned so far?</td>
<td>☝️</td>
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<td>Sept. 21st</td>
<td>What have I learned so far?</td>
<td>Review Quiz CFA</td>
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<tr>
<td>Sept. 22nd</td>
<td>What do I still need to work on?</td>
<td>Check answers for Review Packet (posted on blog)</td>
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<tr>
<td>Sept. 23rd</td>
<td>Can I show what I’ve learned?</td>
<td>☝️</td>
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</table>
Students will represent and operate with complex numbers.
   a. Write square roots of negative numbers in imaginary form.
   b. Write complex numbers in the form $a + bi$.
   c. Add, subtract, multiply, and divide complex numbers.
   d. Simplify expressions involving complex numbers.

Students will solve quadratic equations and inequalities in one variable.
   a. Solve equations graphically using appropriate technology.
   b. Find real and complex solutions of equations by factoring, taking square roots, and applying the quadratic formula.
   c. Analyze the nature of roots using technology and using the discriminant.
   d. Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.

Students will analyze quadratic functions in the forms $f(x) = ax^2 + bx + c$ and $f(x) = a(x - h)^2 + k$.
   a. Convert between standard and vertex form.
   b. Graph quadratic functions as transformations of the function $f(x) = x^2$.
   c. Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.
### Standard Form and Vertex Form Conversion

<table>
<thead>
<tr>
<th>Write the quadratic function in vertex form.</th>
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</thead>
<tbody>
<tr>
<td>1. ( y = x^2 + 4x + 7 )</td>
<td>2. ( y = 3x^2 + 6x - 11 )</td>
</tr>
<tr>
<td>3. ( y = x^2 - 4x + 1 )</td>
<td>4. ( y = 2x^2 + 8x + 1 )</td>
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</table>

<table>
<thead>
<tr>
<th>Write the quadratic function in standard form.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. ( y = (x - 2)^2 + 6 )</td>
</tr>
<tr>
<td>7. ( y = 3(x - 3)^2 - 12 )</td>
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</table>
Analyzing Graphs of quadratic functions

For the following quadratic functions, describe the characteristics.

1.
Domain
Range
Maximum Value
Minimum Value
Zeros
y-intercept
Axis of symmetry (write as $x = \_\_$)
Vertex

2.
Domain
Range
Maximum Value
Minimum Value
Zeros
y-intercept
Axis of symmetry (write as $x = \_\_$)
Vertex
3.
Domain
Range
Maximum Value
Minimum Value
Zeros
y-intercept
Axis of symmetry (write as \( x = \ldots \))
Vertex

4.
Domain
Range
Maximum Value
Minimum Value
Zeros
y-intercept
Axis of symmetry (write as \( x = \ldots \))
Vertex
Rate of Change and Interval of Increase and Decrease

Given the graph below answer the following questions:

True or False:
1. The interval from \(-3 \leq x \leq -1\) is decreasing.
2. The interval from \(-2 \leq x \leq 0\) is increasing.
3. The interval from \(0 \leq x \leq 5\) is increasing.
4. The interval from \(-2 \leq x \leq 2\) is increasing.

5. State the interval of increase and decrease of the graph at right.

6. Using the graph above, calculate the average rate of change from \(-2 \leq x \leq 0\).

7. Using the graph above, calculate the average rate of change from \(1 \leq x \leq 2\).

8. Using the graph above, calculate the average rate of change from \(-2 \leq x \leq 2\).

9. What is the domain and range of the graph above?

Use the graph at right for questions 10-14.

10. On what interval is the graph increasing?

11. On the interval from \(-\infty \leq x \leq 2.5\) is the graph decreasing? Why or what not?

12. Find the average rate of change on the interval \(3 \leq x \leq 5\).

13. Find the average rate of change on the interval \(0 \leq x \leq 2\).

14. Find the domain and range of the graph at right.
A football player's football kick is graphed above. Answer the following questions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Time in Seconds</th>
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<tbody>
<tr>
<td>1. What is ball’s initial height?</td>
<td></td>
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<tr>
<td>2. How many seconds is the ball in the air for?</td>
<td></td>
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<tr>
<td>3. How high does the player kick the ball?</td>
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</tr>
<tr>
<td>4. At what time is the ball at its highest height?</td>
<td></td>
</tr>
<tr>
<td>5. During what time interval is the football’s height increasing?</td>
<td></td>
</tr>
<tr>
<td>6. During what time interval is the football’s height decreasing?</td>
<td></td>
</tr>
<tr>
<td>7. When is the football 15 feet off the ground?</td>
<td></td>
</tr>
<tr>
<td>8. Find the average rate of change of the football’s height from $1 \leq t \leq 7$.</td>
<td></td>
</tr>
<tr>
<td>9. Find the average rate of change of the football’s height from $0 \leq t \leq 8$.</td>
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</table>
John goes bungy jumping off a bridge. His position of his fall and his bounce back is graphed above. Answer the following questions.

1. How high is the bridge John bungeed off of?
2. How many seconds was John’s fall?
3. How close to the ground did John get?
4. At what time was he the closest to the ground?
5. During what time interval is John’s graph increasing?
6. During what time interval is the John’s graph decreasing?
7. There is a seconds bridge that is 20 feet off the ground. At what time did John pass that bridge?
8. Find the average rate of change of John’s graph from $4 \leq t \leq 6$.
9. Find the average rate of change of John’s graph from $3 \leq t \leq 8$. 
Describe all of transformations of the graphs below.

1. \( y = x^2 - 4 \)

2. \( y = (x - 3)^2 + 1 \)

3. \( y = -(x + 2)^2 \)

4. \( y = 3(x + 7)^2 - 5 \)

Given the graphs below, write the equations. And give the requested information.

5. \[ \text{Equation:} \]
   \[ \text{Domain:} \quad \text{Range:} \]

6. \[ \text{Equation:} \]
   \[ \text{Domain:} \quad \text{Range:} \]

7. \[ \text{Equation:} \]

8. \[ \text{Equation:} \]
Graph the function. Label the vertex and axis of symmetry.

13. \[ y = (x + 1)^2 + 3 \]
14. \[ y = (x - 2)^2 - 4 \]
15. \[ y = (x + 2)^2 - 3 \]
16. \[ y = -2(x + 1)^2 - 4 \]
17. \[ y = 2(x + 2)^2 - 4 \]
18. \[ y = -(x - 4)^2 + 8 \]
Practice Graphing the following quadratics in Standard Form.

1. \( y = x^2 + 6x + 5 \)
2. \( y = -2x^2 + 8x - 9 \)
3. \( y = 2x^2 + 4x + 1 \)
4. \( y = 3x^2 + 6x + 2 \)
5. \( y = -x^2 + 4x - 2 \)
6. \( y = \frac{1}{2} x^2 - 4x + 5 \)
7. \( y = -2(x + 3)^2 + 7 \)
8. \( y = 3(x + 4)^2 \)
9. \( y = \frac{1}{2} (x - 2)^2 - 6 \)
MM2A4d Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.

**Exercise Set A**

Determine whether the ordered pair is a solution of the inequality.
1. $y < x^2 + 2x + 2$, $(1, 6)$
2. $y > x^2 - 5x$, $(2, -3)$
3. $y \leq 2x^2 - 7x$, $(4, 4)$
4. $y \geq -2x^2 + 3x - 6$, $(-1, -12)$

Match the inequality with its graph.
5. $y \geq x^2 + 4x - 1$
6. $y < -2x^2 + 3x - 5$
7. $y \leq \frac{1}{2}x^2 - x - 1$
8. $y \geq x^2 - 2$
9. $y < -x^2 - 2x + 1$
10. $y \leq x^2 - 3x + 2$

Graph the inequality.
11. $y > 3x^2 - 8x$
12. $y < -6x^2 + 2x + 3$
13. $y \geq 4x^2 - x - 7$
14. $y \geq x^2 + 2x - 8$
15. $y > -2x^2 - 14x + 21$
16. $y \leq 5x^2 + 2x - 6$

**Error Analysis** Describe and correct the error in graphing $y \geq x^2 - 1$.

17. 
18. 
### WS #6: Solving Quadratic Inequalities Algebraically

Solve the inequality algebraically.

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<tbody>
<tr>
<td>1. $x^2 - x - 30 \geq 0$</td>
<td>2. $x^2 + x - 12 &gt; 0$</td>
</tr>
<tr>
<td>3. $x^2 - 3x - 18 &lt; 0$</td>
<td>4. $3x^2 - 7x - 6 \leq 0$</td>
</tr>
<tr>
<td>5. $4x^2 - 5x - 6 \leq 0$</td>
<td>6. $2x^2 - 11x + 15 &gt; 0$</td>
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</table>