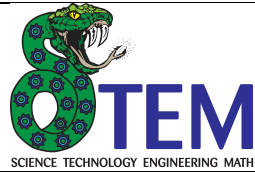


# Unit 1: Hunter Museum - Innovating Art

Unit Length: 5 Weeks



## Mathematics Unit Plan

Teacher: Hill

Grade: 10

Course: Algebra II

Unit Title: Hunter Museum – Innovating Art - Functions and Quadratics

### LEARNING TARGETS

- LT 1:** I can interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship for a function that models a relationship between two quantities, (CCSS.F.IF.4)
- LT 2:** I can write a function that describes a relationship between two quantities. (CCSS.F.BF.1)
- LT 3:** I can calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. (CCSS.F.IF.6)
- LT 4:** I can use the structure of an expression to identify ways to rewrite it. (CCSS.A.SSE.2)
- LT 5:** I can choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (CCSS.A.SSE.3)
- LT 6:** I can explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. (CCSS.A.REI.1)
- LT 7:** I can explain why the  $x$ -coordinates of the points where the graphs of the equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$ ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where  $f(x)$  and/or  $g(x)$  are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. (CCSS.A.REI.11)

### UNIT OVERVIEW

Overall summary of the unit, activities, tasks, and/or content.

Students will review the properties and attributes of functions. They will also discover connections among the representations of quadratic equations and learn various ways to solve them. Students will then use their understanding of functions and transformations to create drafts of their Hunter digital creations/recreations.

### MOTIVATORS

Hooks for the unit and supplemental activities. (PBL scenarios, video clips, websites, literature)

Students will be introduced to the Math Design Collaborative (MCD) “Functions in Everyday Situations” to help them see connections between algebra and the real world. Then students will have a “shoot-out” in which they will discover and discuss the path a basketball takes from hands to the hoop in order to introduce the concept of parabolas.

Week	Learning Targets	Materials & Resources	Instructional Procedures	Differentiated Instruction	Assessment
1-2	<p><b>LT 1:</b> For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship (CCSS.F.IF.4)</p> <p><b>LT 2:</b> Write a function that describes a relationship between two quantities. (CCSS.F.BF.1)</p>	<p><b>Materials</b></p> <ul style="list-style-type: none"> <li>- MDC – Functions in Every Day Situations <a href="http://map.mathshell.org/materials/lessons.php?taskid=430#task430">http://map.mathshell.org/materials/lessons.php?taskid=430#task430</a></li> <li>- MDC – printouts, need to be cut prior to activity</li> <li>- Draw a picture using functions packet (<a href="http://www.bugforteachers.com/files/Download/Draw%20a%20picture%20with%20functions.pdf">http://www.bugforteachers.com/files/Download/Draw%20a%20picture%20with%20functions.pdf</a>)</li> </ul> <p><b>iPad Apps</b></p> <p>HMH Fuse App: Algebra 2 Common Core</p> <p><b>Equipment</b></p> <ul style="list-style-type: none"> <li>- iPad</li> </ul>	<p><b>Essential Questions</b></p> <p>How do you apply transformations to different families of functions?</p> <p><b>Set</b></p> <p>Give the <i>Four Situations</i> pre-assessment task from MDC – Functions in Every Day Situations. This will help students see the connection between Algebra and real-world situations.</p> <p><b>Teaching Strategies</b></p> <p>MDC – Functions in Everyday Situations</p> <ul style="list-style-type: none"> <li>- The pre-test is given on the first day of the lesson introduction</li> </ul> <p>Student will work independently and cooperatively on daily assignments from the HMH Fuse App</p> <p>Students will write functions from a teacher chosen picture out of the Draw a Picture Using Functions Packet</p> <p><b>Summarizing Strategy</b></p> <p>Students will use their understanding of parent functions and transformations to write functions from a picture drawn on a coordinate plan.</p> <p><b>Homework from HMH Fuse Common Core App</b></p> <p>1-1 PR Exercises: 16, 18, 20, 24, 26, 40, 42 AD Exercises: PR, 38, Challenge and Extend</p> <p>1-2 PR Exercises: 9, 11, 14, 16, 30, 36 AD Exercises: PR, 28, Challenge and Extend</p> <p>1-3 PR Exercises: 1 8, 12, 14, 15, 22 AD Exercises: PR, 23, Challenge and Extend</p> <p>1-4 PR Exercises: 5–7, 10, 12 AD Exercises: PR, 13, 15, Challenge and Extend</p>	<p><b>Remediation</b></p> <ul style="list-style-type: none"> <li>- Lesson Intervention (from HMH 1.1-1.4) or - Explorations in Math (from HMH 1.1-1.4)</li> </ul> <p><b>Enrichment</b></p> <ul style="list-style-type: none"> <li>-Challenges 1-4 (from HMH) OR</li> <li>-Problem Solving 1-4 (from HMH) OR</li> <li>- <i>Big as a Whale</i> (ch 1 project from HMH)</li> </ul> <p><b>Learning Styles</b></p> <p>Visual Auditory Kinesthetic</p>	<p><b>Formative Assessments:</b></p> <ul style="list-style-type: none"> <li>-Homework</li> <li>-Performance tasks from HMH</li> </ul>
3	<p><b>LT 1:</b> For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal</p>	<p><b>Materials</b></p> <ul style="list-style-type: none"> <li>- MDC – Functions in Every Day Situations <a href="http://map.mathshell.org/materials/lessons.php?taskid=430#task430">http://map.mathshell.org/materials/lessons.php?taskid=430#task430</a></li> <li>- Function Transformations Card Matching Activity from the website Partially Derivative: <a href="http://partiallyderivative.wordpress.com/2013/12/04/function-transformations-card-matching-activity/">http://partiallyderivative.wordpress.com/2013/12/04/function-transformations-card-matching-activity/</a></li> </ul>	<p><b>Essential Questions</b></p> <p>What connections are among representations of various function families? How do you operate and solve problems with functions and their inverses?</p> <p><b>Set</b></p> <p>Complete MDC – Functions in Everyday Situations</p> <ul style="list-style-type: none"> <li>- Students will work in small groups/pairs to complete the lesson</li> </ul> <p><b>Teaching Strategies</b></p> <p>MDC completion</p> <ul style="list-style-type: none"> <li>- The lesson is completed over two days two-three days later</li> <li>- About a week after the lesson, the post-assessment is given</li> </ul> <p>Student will work independently and cooperatively on daily assignments from the HMH Fuse App</p>	<p><b>Remediation</b></p> <ul style="list-style-type: none"> <li>- Lesson Intervention (from HMH 6.1-6.4) or - Explorations in Math (from HMH 6.1-6.4)</li> </ul> <p><b>Enrichment</b></p> <ul style="list-style-type: none"> <li>-Challenges 1-4 (from HMH) OR</li> <li>-Problem Solving 1-4 (from HMH) OR</li> </ul>	<p><b>Formative Assessments:</b></p> <ul style="list-style-type: none"> <li>-Homework</li> </ul> <p><b>Performance Assessments:</b></p> <p>MDC – Functions in Every Day Situations <a href="http://map.mathshell.org/materials/lessons.php?taskid=430#task430">http://map.mathshell.org/materials/lessons.php?taskid=430#task430</a></p> <p><b>Summative</b></p>

	<p>description of the relationship (CCSS.F.IF.4)</p> <p><b>LT 2:</b> Write a function that describes a relationship between two quantities. (CCSS.F.BF.1)</p> <p><b>LT 3:</b> I can use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. CCSS. (G-GPE7)</p>	<p>- Needs to be printed and cut prior to activity</p> <p><b>iPad Apps</b> HMH Fuse App: Algebra 2 Common Core</p>	<p><b>Summarizing Strategy</b> Students will play the function transformations card matching activity in pairs. The matches will be checked by the teacher and discussed as needed.</p> <p><b>Homework from HMH Fuse Common Core App</b> 6-1 PR Exercises: 8, 10, 12, 14, 20 AD Exercises: PR, 24, Challenge and Extend 6-2 Exercises: 5, 6, 10, 14, 18 AD Exercises: PR, Challenge and Extend 6-3 PR Exercises: 10, 12, 14, 15, 16, 20 AD Exercises: PR, 27, Challenge and Extend 6-4 Exercises: 8, 14, 18, 19, 20 AD Exercises: PR, 23, Challenge and Extend</p>	<p>- <i>Cosmic Deris</i> (ch 6 project from HMH if not completed in week 1)</p> <p><b>Learning Styles</b> Visual Auditory Kinesthetic</p>	<p><b>Assessments:</b> Foundations, Properties, &amp; Attributes of <math>f(x)</math>s - Summative Test</p>
3-5	<p><b>LT 1:</b> For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship (CCSS.F.IF.4)</p> <p>Learning Target 2: Write a function that describes a relationship between two quantities.</p>	<p><b>Materials</b> - Trash cans or some other type of basketball hoop - Paper-wads or some other type of "ball"</p> <p>MDC – Forming Quadratics <a href="http://map.mathshell.org/materials/lessons.php?taskId=224&amp;subpage=concept">http://map.mathshell.org/materials/lessons.php?taskId=224&amp;subpage=concept</a> - MDC – printouts, need to be cut prior to activity</p> <p><b>Websites:</b> - <b>Introducing Quadratics</b> - <a href="http://www.fishing4tech.com/introducing-quadratics.html">http://www.fishing4tech.com/introducing-quadratics.html</a> - <b>Will it hit the hoop?</b> - <a href="http://blog.mrmeyer.com/2010/wcydwt-will-it-hit-the-hoop/">http://blog.mrmeyer.com/2010/wcydwt-will-it-hit-the-hoop/</a></p> <p><b>Equipment</b> - iPad</p>	<p><b>Essential Questions</b> What connections are among representations of quadratic functions? How do you use various methods to solve quadratic equations and apply them to real- world problems?</p> <p><b>Set</b> Have students in pairs or sets shoot "basketball" into trash cans or some other type of hoop. They should take pictures of each other taking the shots. After the shooting, they should each examine their picture. Each student should sketch the path the ball should take in order to go into the basket. Have students talk about their sketches and compare them with one another.</p> <p><b>Teaching Strategies</b> Trash can basketball - Students will analyze the photos from "Will it hit the hoop" - Teacher will lead students in a discussion about curves that will lead to a shot going in or missing and what the key features of that curve are. - Students shoot and video/photo their shots into a trashcan. - Students then create their own "Will it hit the Hoop?" and share with another group to determine if the shot will hit or miss and describe why.</p> <p>Student will work independently and cooperatively on daily assignments from the HMH Fuse App</p> <p>Students will complete the MDC Lesson <i>Forming Quadratics</i>: - pre-assessment</p>	<p><b>Remediation</b> - Lesson Intervention (from HMH 2.1-2.6) or - Extensions in Math (from HMH 2.1-2.6)</p> <p><b>Enrichment</b> -Challenges 1-6 (from HMH) OR -Problem Solving 1-6 (from HMH) - <i>Planetary Pass</i> (ch 2 project from HMH)</p> <p><b>Learning Styles</b> Visual Auditory Kinesthetic</p>	<p><b>Formative Assessments:</b> - Homework</p> <p><b>Performance Assessments:</b> MDC – Forming Quadratics <a href="http://map.mathshell.org/materials/lessons.php?taskId=224&amp;subpage=concept">http://map.mathshell.org/materials/lessons.php?taskId=224&amp;subpage=concept</a></p> <p><b>Summative Assessments:</b> Quadratics – Summative Test</p>

<p>(CCSS.F.BF.1)</p> <p>Learning Target 4: Use the structure of an expression to identify ways to rewrite it. (CCSS.A.SSE.2)</p> <p>Learning Target 5: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (CCSS.A.SSE.3)</p> <p>Learning Target 6: Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. (CCSS.A.REI.1)</p> <p>Learning Target 7: Explain why the <math>x</math>-coordinates of the points where the graphs of the equations <math>y =</math></p>	<p><b>iPad Apps</b></p> <p>HMH Fuse App: Algebra 2 Common Core</p>	<p>- lesson - post-assessment</p> <p><b>Summarizing Strategy</b></p> <p>Students will collaboration among their groups to discuss their solutions to the MDC problems. Following returning to their own groups they will correct any mistakes they have made. Then there will be a whole class discussion on misconceptions.</p> <p><b>Homework from HMH Fuse Common Core App</b></p> <p>2-1 Exercises: 18, 20, 28, 30, 31, 40 AD Exercises: PR, 45, Challenge and Extend</p> <p>2-2 Exercises: 12, 16, 24, 30, 31 AD Exercises: PR, 41, Challenge and Extend</p> <p>2-3 Exercises: 18, 22, 27, 28, 34, 46 AD Exercises: PR, 66, Challenge and Extend (evens)</p> <p>2-4 Exercises: 8 20, 24, 26, 32, 40, 64 AD Exercises: PR, 61, Challenge and Extend (evens)</p> <p>2-5 Exercises: 18, 22, 26, 28, 34, 36 AD Exercises: PR, 75, Challenge and Extend</p> <p>2-6 Exercises: 18, 24, 30, 36, 44 AD Exercises: PR, 60, Challenge and Extend (evens)</p>		
---	--	---	--	--

<p><math>f(x)</math> and <math>y = g(x)</math> intersect are the solutions of the equation <math>f(x) = g(x)</math>; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where <math>f(x)</math> and/or <math>g(x)</math> are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. (CCSS.A.REI.11)</p>				
--	--	--	--	--