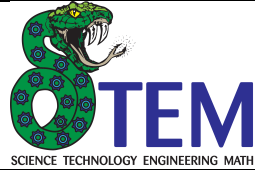


# Unit 1: Hunter Museum - Innovating Art

Unit Length: 5 Weeks



## Mathematics Unit Plan

Teacher: Hill

Grade: 10

Course: Geometry

Unit Title: Hunter Museum – Innovating Art

### LEARNING TARGETS

**LT 1:** I can define angle, circle, perpendicular line, parallel line, and line segment in relation to the ideas of point, line, distance along a line and a circular arc. (CCSS.G-CO1)

**LT 2:** I can make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). (CCSS.G-CO12)

**LT 3:** I can use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. (CCSS.G-GPE7)

**LT 4:** I can describe the rotations and reflections of a rectangle, parallelogram, trapezoid, or regular polygon. (CCSS.G-CO3)

**LT 5:** I can define rotations, reflections, and translations as they relate to angles, circles, perpendicular lines, parallel lines, and line segments. (CCSS.G-CO4)

**LT 6:** I can rotate, reflect, or translate a given geometric figure and its rotation using, graph paper, tracing paper, or geometry software as well as describe the sequence of transformations necessary to move a geometric figure to a new position. (CCSS.G-CO5)

**LT 7:** I can use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. (CCSS.G-CO6)

### UNIT OVERVIEW

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

Students will explore the foundations of geometry through learning about points, lines, and planes. Students will also explore transformations in the coordinate plane. Then students will explore how these geometrical concepts are used to design works of art.

### MOTIVATORS

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

Students will view MC Eschers website and will visit the Hunter Museum. They will explore the use of geometry in the artwork from the website and from the pieces of art they view at the Hunter. Students will then design their own work of art utilizing basic geometrical figures.

Week	Learning Targets	Materials & Resources	Instructional Procedures	Differentiated Instruction	Assessment
1	<p><b>LT 1:</b> I can define angle, circle, perpendicular line, parallel line, and line segment in relation to the ideas of point, line, distance along a line and a circular arc. (CCSS.G-CO1)</p> <p><b>LT 2:</b> I can make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). (CCSS.G-CO12)</p>	<p><b>Websites:</b> - M.C. Escher Website: <a href="http://www.mcescher.com">http://www.mcescher.com</a></p> <p><b>Materials:</b> - Patty Paper - Compass - Protractor - Straight edge - "Picture This" project sheet from Ch 1; - geoboard, colored rubber bands or string (for <i>Picture This</i>) - wooden board, small nails, hammer, colored string or thread (for <i>Picture This</i>)</p> <p><b>iPad Apps</b> - HMH Fuse App: Geometry Common Core - Geometry: <a href="#">Geometry: Constructions Tutor app</a> - <a href="#">Sketchpad Explorer App</a></p> <p><b>Sketchpad Activities:</b> (from <a href="http://sketchexchange.keypress.com">sketchexchange.keypress.com</a>) - <a href="#">Points, Lines and Planes</a> by BobWMath - <a href="#">Linear Pair</a> by MPatty - <a href="#">Vertical Angles</a> by daboypp OR <a href="#">Vertical Angles</a> by MPatty - <a href="#">Complementary and Supplementary Angles</a> by daboypp - <a href="#">Construction: Copying a Segment</a> by MPatty - <a href="#">Construction: Angle Bisector</a> by MPatty</p>	<p><b>Essential Questions</b> How do you apply basic facts about points, lines, and planes? How do you construct midpoints and congruent segments? How do you measure and construct angles and angle bisectors? Can you identify adjacent, vertical, complementary, and supplementary angles and find measures of pairs of angles?</p> <p><b>Set</b> Have students look at and discuss MC Escher's work from <a href="http://www.mcescher.com">http://www.mcescher.com</a>. Guide the discussion to the geometry involved in his drawings and how a great deal of geometry shapes and concepts are used in creating works of art.</p> <p><b>Teaching Strategies</b></p> <ul style="list-style-type: none"> <li>- Students will participate in small group discussion about geometric elements identified in Escher's work.</li> <li>- Students will present to the class their choice of art to describe the geometric elements they see.</li> <li>- Students will read/complete sketchpad activities on their iPad and then summarize verbally or in writing the content of each lesson.</li> <li>- Student will work independently and cooperatively on daily assignments from the HMH Fuse App</li> </ul> <p><b>Summarizing Strategy</b> Students will compare and contrast the iPad activities they completed as performance assessments. They will describe verbally or in writing their similarities and differences of the lesson content and critique the app lesson/functions.</p> <p><b>Homework from HMH Fuse Common Core App</b> 1-1 PR Exercises: 14–20 even, 24, 26, 28, 32 AD Exercises: PR, 30, Challenge and Extend 1-2 PR Exercises: 12–14, 16, 18, 20, 22, 31 AD Exercises: PR, 19, Challenge and Extend 1-3 PR Exercises: 11, 12, 16, 18, 20, 26, 30 AD Exercises: PR, 33, 37, Challenge and Extend 1-4 PR Exercises: 14, 18, 22, 24, 28, 30, 34 AD Exercises: PR, 33, Challenge and Extend</p>	<p><b>Remediation</b> - Lesson Intervention (from HMH 1.1-1.4) or - Explorations in Math (from HMH 1.1-1.4)</p> <p><b>Enrichment</b> -Challenges 1-4 (from HMH) OR -Problem Solving 1-4 (from HMH) OR - <i>Picture This</i> (ch 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> -Constructions Tutor App</p> <p>- Summary comparison/description of content from the sketchpad lessons.</p>
2	<p><b>LT 3:</b> I can use coordinates to compute perimeters of</p>	<p><b>Materials</b> - Pythagorean Theorem QR Code Practice sheet (from <a href="http://teacherspayteachers.com">teacherspayteachers.com</a>)</p>	<p><b>Essential Questions</b> How do you apply formulas for perimeter, area, and circumference? How can you find midpoints of segments and distances in the coordinate plane?</p>	<p><b>Remediation</b> - Lesson Intervention (from HMH 1.5-</p>	<p><b>Formative Assessments:</b> -Homework</p>

	<p>polygons and areas of triangles and rectangles, e.g., using the distance formula. (CCSS.G-GPE7)</p>	<p>- Tasks 1-8 from <a href="http://tncore.org/sites/www/Uploads/Aug_23/MATH/Geo_guide_arc.pdf">http://tncore.org/sites/www/Uploads/Aug_23/MATH/Geo_guide_arc.pdf</a></p> <p><b>iPad Apps</b></p> <p>- HMH Fuse App: Geometry Common Core</p>	<p><b>Set</b></p> <p>Students will begin by refreshing themselves with the Pythagorean Theorem. They will go through the room and solve problems and will check them by scanning the QR code to reveal the answer (taken from teacherspayteachers.com)</p> <p><b>Teaching Strategies</b></p> <ul style="list-style-type: none"> <li>- Student will work independently and cooperatively on daily assignments from the HMH Fuse App</li> <li>- Students will work in pairs to solve Pythagorean theorem problems and check them using the QR code practice sheet.</li> <li>- Students will work in small groups of 2-3 to complete Tasks 1-8 from the TNCore website.</li> </ul> <p><b>Summarizing Strategy</b></p> <p>Prior to the review, students will complete a K-W-L chart about what they know about: perimeter, circumference, area, midpoints and distances in the coordinate plane. Any questions or misunderstandings that arise will be address during review.</p> <p><b>Homework from HMH Fuse Common Core App</b></p> <p>1-5 PR Exercises: 10, 14, 24, 34, 36, 38, 42 AD Exercises: PR, 23, 30, Challenge and Extend</p> <p>1-6 Exercises: 12, 14, 16, 18, 21, 26, 30 AD Exercises: PR, 29, 33, Challenge and Extend</p>	<p>1.6) or - Explorations in Math (from HMH 1.5-1.6)</p> <p><b>Enrichment</b></p> <ul style="list-style-type: none"> <li>-Challenges 5-6 (from HMH) OR</li> <li>-Problem Solving 5-6 (from HMH) OR</li> <li>- <i>Picture This</i> (ch 1 project from HMH if not completed in week 1)</li> </ul> <p><b>Learning Styles</b></p> <p>Visual Auditory Kinesthetic</p>	<p><b>Performance Assessments:</b></p> <p>Tasks 1-8 from <a href="http://tncore.org/sites/www/Uploads/Aug_23/MATH/Geo_guide_arc.pdf">http://tncore.org/sites/www/Uploads/Aug_23/MATH/Geo_guide_arc.pdf</a></p> <p><b>Summative Assessments:</b></p> <p>Foundations for Geometry – Summative Test</p>
3-5	<p><b>LT 4:</b> I can describe the rotations and reflections of a rectangle, parallelogram, trapezoid, or regular polygon. (CCSS.G-CO3)</p> <p><b>LT 5:</b> I can define rotations, reflections, and translations as they relate to angles, circles, perpendicular lines, parallel lines, and line segments. (CCSS.G-CO4)</p> <p><b>LT 6:</b> I can rotate, reflect, or translate a given</p>	<p><b>Materials</b></p> <p>“Transformers” movie clip of your choice or action figure</p> <p><b>MDC Lesson – Transforming 2D Figures -</b> <a href="http://map.mathshell.org/materials/lessons.php?taskid=524&amp;subpage=concept">http://map.mathshell.org/materials/lessons.php?taskid=524&amp;subpage=concept</a></p> <p><b>MDC Lesson – Representing and Combining Transformations -</b> <a href="http://map.mathshell.org/materials/lessons.php?taskid=490&amp;subpage=concept">http://map.mathshell.org/materials/lessons.php?taskid=490&amp;subpage=concept</a></p> <p><b>iPad Apps</b></p> <ul style="list-style-type: none"> <li>- HMH Fuse App: Geometry Common Core</li> <li>- Transformations app - <a href="https://itunes.apple.com/us/app/transformations/id576236897?mt=8">https://itunes.apple.com/us/app/transformations/id576236897?mt=8</a></li> </ul>	<p><b>Essential Questions</b></p> <p>How can transformations be used to create works of art?</p> <p><b>Set</b></p> <p>The teacher will relate transformations to the movie transformers or a transformer toy. This will help students build a connection between the transformation and the change that shapes go through.</p> <p><b>Teaching Strategies</b></p> <ul style="list-style-type: none"> <li>- Student will work independently and cooperatively on daily assignments from the HMH Fuse App</li> <li>- Teacher and student will review transformations on the “Transformations” app and then students will self-quiz in the app and show the teacher after each quiz.</li> <li>- Students will take the MDC pre-assessment</li> <li>- Students will complete MDC lesson in small group collaborations</li> <li>- Students will take MDC post-assessment</li> </ul> <p><b>Summarizing Strategy</b></p> <p>Students will complete either the MDC “Transforming 2-D Figures” and/or “Representing and Combining Transformations” activities. Then there will be a whole class discussion on best ways to solve problems and the possibilities of multiple combinations of transformations have the same end result.</p>	<p><b>Remediation</b></p> <ul style="list-style-type: none"> <li>- Lesson Intervention (from HMH 1.7 &amp; 9.1-9.7) or - Extensions in Math (from HMH 1.7 &amp; 9.1-9.7)</li> </ul> <p><b>Enrichment</b></p> <ul style="list-style-type: none"> <li>-Draw a tessellation work of art</li> <li>-Challenges 1-7 (from HMH) OR</li> <li>-Problem Solving 1-7 (from HMH)</li> <li>- <i>Let it Snow!</i> (ch 9 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> </ul> <p><b>Performance Assessments:</b></p> <p>MDC “Transforming 2-D Figures” and/or “Representing and Combining Transformations”</p> <p><b>Summative Assessments:</b></p> <p>Extending Transformational Geometry – Summative Test</p>

<p>geometric figure and its rotation using, graph paper, tracing paper, or geometry software as well as describe the sequence of transformations necessary to move a geometric figure to a new position. (CCSS.G-CO5)</p> <p><b>LT 7:</b> I can use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. (CCSS.G-CO6)</p>	<p>- if iPad not available or you prefer PCs -  <u>Transformations in a Dynamic Environment</u> -  <a href="http://www.maa.org/publications/periodicals/loci/resources/exploring-geometric-transformations-in-a-dynamic-environment-description">http://www.maa.org/publications/periodicals/loci/resources/exploring-geometric-transformations-in-a-dynamic-environment-description</a></p>	<p><b>Homework from HMH Fuse Common Core App</b></p> <p>1-7 Exercises: 8, 10–12, 14, 18, 26, 28  AD Exercises: PR, 28, Challenge and Extend</p> <p>9-1 Exercises: 14, 18, 19, 20, 24  AD Exercises: PR, 27, 37 Challenge and Extend</p> <p>9-2 Exercises: 12, 16, 18, 20, 22, 24  AD Exercises: PR, 27, Challenge and Extend (evens)</p> <p>9-3 Exercises: 14, 16, 18, 20, 22, 28  AD Exercises: PR, 31, Challenge and Extend (evens)</p> <p>9-4 Exercises: 8, 10–12, 16, 18  AD Exercises: PR, 22, Challenge and Extend</p> <p>9-5 Exercises: 14, 16, 19, 20, 24, 30  AD Exercises: PR, 34, 37, Challenge and Extend (evens)</p> <p>9-6 Exercises: 16, 18, 22, 24, 28  AD Exercises: PR, 36, Challenge and Extend</p> <p>9-7 Exercises: 14, 18, 19, 20, 24  AD Exercises: PR, 30, Challenge and Extend</p>		
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