

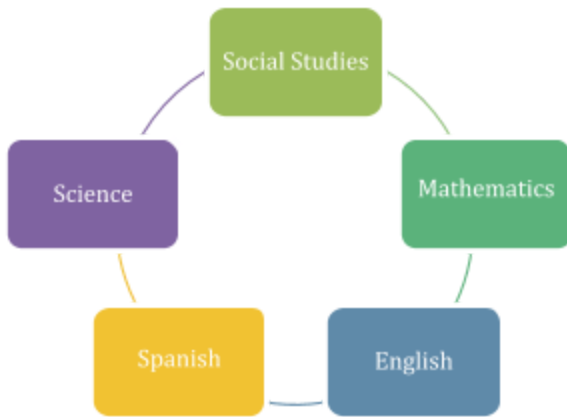
# STEM School Chattanooga

## 10<sup>th</sup> Grade PBL

### Unit Plan Template

### Unit 1: Hunter Museum Partnership –Digitally Innovating Art

#### Learning Target Topics



Algebra II: Creating functions using function transformations.

Geometry: Geometric transformations using rigid and non-rigid motions.

English II: Document and share the creative process in a way that the audience can understand and easily follow.

Chemistry: Understanding the Periodic Table.

U.S. History: Present the historic and artistic value of the original piece and explain how the recreation connects and artistic value.

Spanish: Present information in Spanish about the author’s nationality, theme, techniques, visual features and date of the art piece.

Grade Level	10 <sup>th</sup> Grade	Unit Length	9 Weeks
Unit Overview	Groups will research an art piece from the Hunter Museum of Art in Chattanooga, TN. They will investigate the historical time period and influences on the artist and work of art. Student products will include reconstructing a portion of the artwork using mathematical transformations, investigating the Periodic Table, documentation of the creative process, and presenting their chosen piece in Spanish. At the Hunter museum, students will then act as docents and present how their digital interpretation has both a connection and influence, visual and non-visual, to the original piece.		
Unit Essential Issue	<b>Problem:</b> Students will use digital tools to reinterpret and innovate a piece of art.		
Kick Off Event	<p><b>Delivery - Monday, August 14</b>            10th grade students will recreate famous art pieces using their iPads. Teachers will model the recreation process, sharing their thinking as they go through the process of innovating and building upon the original piece. Teachers will then support and guide students through their own recreation of the same famous art pieces.</p> <p><b>Kick Off - Tuesday, August 15</b>            10th grade students and teachers visit the Hunter Museum from 10am to 11:30am            Students will work in teams of 3-4. Teams will be chosen with consideration of art piece preferences submitted after visiting the Hunter Museum.</p>		

**Practice Run – Tuesday, September 26**  
 10th grade students and teachers visit the Hunter Museum from 10am to 12pm. Student teams set up at their art piece location. This is practice for the first free Thursday in October to make sure students are ready to communicate professionally and meaningfully with the public. STEM teachers and museum staff will walk around the museum in order to provide feedback to each team.


**Culminating Events**

**Deadline Day – Tuesday, October 3**  
 The following items are due to the appropriate content area teacher:

- **Algebra II:** Groups will turn in a copy of artwork with labeled x- and y-axis and transformed functions along with a written explanation for their work.
- **Geometry:** Groups will turn in a copy of artwork with labeled x- and y-axis and transformed geometric shapes along with a written explanation for their work.
- **Chemistry:** Students will write and film an interview with the “artist” of their piece. In their interview they will discuss the elements found in either their original piece or the group designed piece.
- **English II:** Groups will turn in a final video documenting their creation of the artwork they designed.
- **Spanish I:** Groups will turn in a final script in Spanish of their docent talk and a written reflection in English about the project to their Spanish teacher.
- **U.S. History:** Students will turn in a script outlining their Docent presentation. Presentation should include a history of the piece, a reflection of the artist's career and other works, what aspects of the original piece are reflected in the recreation, and how the group's innovation is present in the recreation. Talk can also include the process of how the recreation came together. Talk should be 3-5 minutes with each member participating equally.

**Gallery Walk – Wednesday, October 4**  
 Groups will present all work at STEM School and display their innovative works of art. Students will have the opportunity to view other pieces and talk with other groups.

**Docent Day – Thursday, October 5**  
 Student teams will come to the Hunter Museum of Art on the first free Thursday in October from 6pm to 7pm. Student teams will set up their innovative piece next to the original art piece in the museum. Teams will stay with these art pieces and act as docents for visitors to the museum. Teams will stay for the hour.

Common Assessment			STEM PBL Rubric		PBL Unit: #1 – Hunter Museum Student: _____ Date: _____
	Math Components: <b>Algebra II</b>		<b>Advanced</b>	<b>Proficient</b>	<b>Needs Improvement</b>
	<ul style="list-style-type: none"> <li>● At least one function type not yet covered in class is used. (possible examples include cubic, radical, exponential, logarithmic functions)</li> <li>● At least 2 functions have three or more transformations</li> <li>● Appropriate domain restrictions are included for all functions</li> <li>● Written explanation describes each transformation clearly and accurately and is error free.</li> </ul>		<ul style="list-style-type: none"> <li>● Students will use transformations of functions to reconstruct a portion of original artwork.</li> <li>● At least one of each of the following functions is used:               <ul style="list-style-type: none"> <li>○ Linear</li> <li>○ Quadratic</li> <li>○ Absolute value</li> </ul> </li> <li>● Functions are drawn on artwork neatly with equations clearly labeled</li> <li>● Each function must have at least 2 transformations, and all four types of transformations (horizontal translation, vertical translation, dilation, reflection) are represented at least once overall.</li> </ul>		

			<ul style="list-style-type: none"> <li>• Written explanation describes each transformation accurately with only 1 or 2 minor errors.</li> </ul>	
	<p><b>Math Components: Geometry</b></p>	<ul style="list-style-type: none"> <li>• At least <u>five</u> of the shapes listed in the proficient section are used.</li> <li>• At least two shapes have <u>four</u> or more transformations, including a dilation and a rotation</li> <li>• Written report describes each transformation clearly and accurately and is error free.</li> <li>• Written report includes discussion of how at least two of the composed transformations could be achieved using an alternate set of transformations.</li> </ul>	<ul style="list-style-type: none"> <li>• Students will use transformations of geometric shapes to reconstruct a portion of original artwork.</li> <li>• Five shapes are graphed on the copy of artwork, with at least 3 of the shapes below represented <ul style="list-style-type: none"> <li>○ Square</li> <li>○ Rectangle</li> <li>○ Trapezoid</li> <li>○ Circle</li> <li>○ Line segment</li> <li>○ Parallelogram</li> <li>○ Right Triangle</li> <li>○ Equilateral Triangle</li> </ul> </li> <li>• Shapes are drawn on artwork neatly with transformations written clearly in arrow notation</li> <li>• Each shape must have at least 2 transformations, and all <u>types</u> of transformations (horizontal translation, vertical translation, dilation, reflection, and rotation) are represented at least once</li> <li>• Written explanation describes each transformation accurately with only 1 or 2 minor errors.</li> </ul>	
	<p><b>Science Components: Chemistry</b></p>	<p>Include the following in your interview:</p> <ul style="list-style-type: none"> <li>• Explain and evaluate why the artist chose the elements/compounds placed in your piece in regards to the chemical and physical properties that lead to the art pieces aesthetics and longevity.</li> <li>• Discuss the chemical and physical processes used to produce the piece.</li> <li>• Predict and explain how you could improve the quality or aesthetics of your art piece if certain elements were changed.</li> <li>• Interview must meet Advanced level using the Hunter PBL Interview Rubric. <a href="http://bit.ly/2bqMyDd">http://bit.ly/2bqMyDd</a></li> </ul>	<ul style="list-style-type: none"> <li>• Students will write and record an interview with the “artist” who created the art piece using either the original art piece or the group recreated art piece using the Hunter PBL Interview Rubric <a href="http://bit.ly/2bqMyDd">http://bit.ly/2bqMyDd</a> Include at least the following content: <ul style="list-style-type: none"> <li>○ Find and list all of the elements/compounds in your art piece.</li> <li>○ Analyze the location of the piece (inside/outside of the museum) in terms of its elements/compounds, and the chemical effect on the elements in the art based on its geographical location.</li> <li>○ Demonstrate knowledge of the Periodic Table and how it ties into your original art piece or the group</li> </ul> </li> </ul>	

			<p>recreated piece: atomic mass, atomic number, number of valence electrons, metal, nonmetal, or metalloid, physical properties, and chemical properties.</p> <ul style="list-style-type: none"> <li>○ Interview must meet Proficient level using the Hunter PBL Interview Rubric. <a href="http://bit.ly/2bqMyDd">http://bit.ly/2bqMyDd</a></li> </ul>	
	<p>Language Arts Components: <b>English II</b></p>	<ul style="list-style-type: none"> <li>● Documentary engages the audience by telling a compelling story of the group's art creation process in a creative way.</li> <li>● All parts of the documentary are recorded, combined, and edited with an attention to detail that enhances audience understanding and engagement.</li> <li>● All elements of the video are of high quality (sound, editing, visuals, etc.).</li> <li>● Thoughtfully answers all reflection questions, fully explaining thinking.</li> <li>● Hook grabs audience attention and interest.</li> </ul>	<ul style="list-style-type: none"> <li>● Documentary explains the group's art creation process.</li> <li>● Answers to reflection questions are mostly thoughtful, though some thinking may not be fully explained or developed.</li> <li>● Hook is attempted but may be awkward or may just tell why the audience should be interested.</li> </ul>	
	<p>Social Studies Components: <b>U.S. History</b></p>	<ul style="list-style-type: none"> <li>● Presentation includes clear and detailed connections to the history of the artist and the original artwork.</li> <li>● Presentation is organized and clearly connects original and recreated art pieces.</li> <li>● Student transitions keep the audience attention and are organized logically.</li> <li>● Similarities and differences between the two art pieces are identified and evaluated.</li> <li>● The presentation is presented clearly and confidently.</li> <li>● Answers to audience questions expound on the knowledge and connections of the presentation using cited evidence.</li> </ul>	<ul style="list-style-type: none"> <li>● Presentation includes a history of the artist and original artwork.</li> <li>● Presentation includes connections of both original and recreation.</li> <li>● Students transition between members with little to no prompting from teammates.</li> <li>● Students identify similarities and differences between the two art pieces from features seen and not seen.</li> <li>● Students speak clearly.</li> <li>● Students are able to answer questions asked about their piece or recreation.</li> </ul>	
	<p>Foreign Language Components: <b>Spanish</b></p>	<ul style="list-style-type: none"> <li>● Spanish oral presentation is memorized.</li> </ul>	<ul style="list-style-type: none"> <li>● Make a digital or physical picture of the redesigned piece and label at least five of its physical features in Spanish. Use this picture along with the oral description of the piece. This will be presented in class.</li> <li>● Information about the author's name and nationality, theme, techniques or style, and at least five visual features with the Spanish explanation behind the feature, and date of the piece.</li> </ul>	

			<ul style="list-style-type: none"> <li>Students will use complete, grammatically and phonetically correct sentences in Spanish to describe the art piece.</li> </ul>	
	<p><b>Minimum Requirement Components: Must be included to be graded</b></p>	<p><b>Algebra II:</b></p> <ul style="list-style-type: none"> <li>Copy of original artwork with x- and y-axis are clearly labeled on <i>copy</i> of original artwork.</li> <li>At least 5 functions are graphed on art piece with equations provided.</li> <li>Written report with verbal explanation of transformations included.</li> </ul> <p><b>Geometry:</b></p> <ul style="list-style-type: none"> <li>Copy of original artwork with x- and y-axis are clearly labeled on copy of original artwork.</li> <li>At least 5 shapes are graphed on art piece and labeled with transformations in correct geometric notation.</li> <li>Written report with verbal explanation of transformations included.</li> </ul> <p><b>Chemistry:</b></p> <ul style="list-style-type: none"> <li>A written script must be submitted with the interview.</li> </ul> <p><b>English II:</b></p> <ul style="list-style-type: none"> <li>Groups will collect artifacts at least weekly to document the design process of their recreations and submit them via the Weekly Prototype Report.</li> <li>Groups will produce a video documenting the creation of their art piece that is <ul style="list-style-type: none"> <li>3-5 minutes</li> <li>Addresses all reflection components: <ul style="list-style-type: none"> <li>Why/how did you choose the piece?</li> <li>What were some ideas to innovate that did not work?</li> <li>Demonstrate the thought process that led to the final product.</li> <li>How did the final product match/differ from original vision?</li> <li>What challenges did you face?</li> <li>Show some of the mock-ups that were rejected by the group.</li> <li>What STEM concepts did you apply to the recreation?</li> <li>Summarize your digital recreation and supply a picture of the final piece.</li> <li>How did this project help you to better understand or engage with the work of art?</li> </ul> </li> <li>Includes artifacts from the entire creation process. Artifacts can include: <ul style="list-style-type: none"> <li>Images of the group's art piece throughout the creation process</li> <li>Videos of specific creation steps (laser engraver, 3-D printer, Shopbot)</li> <li>Written plans or blueprints</li> <li>Individual reflections of group members</li> <li>Images or videos of the group working</li> <li>Images or videos of the final product</li> </ul> </li> </ul> </li> </ul> <p><b>U.S. History:</b></p> <ul style="list-style-type: none"> <li>Presentation must be 3-5 minutes</li> <li>Presentation must be performed in full regardless of group make up.</li> <li>Groups must have a script shared with Mr. Evans and a practice presentation before presenting for a grade.</li> <li>All Group members must speak during the presentation</li> </ul> <p><b>Spanish:</b></p> <ul style="list-style-type: none"> <li>Script of final presentation in Spanish with indications of what each team member should speak about. <ul style="list-style-type: none"> <li>First draft due 9/22/17</li> </ul> </li> <li>Reflection which includes: <ul style="list-style-type: none"> <li>An image of their project</li> <li>An answer in English to the question: How this project has helped you to improve your oral skills in Spanish?</li> </ul> </li> </ul> <p><b>Innovated Art-Piece:</b></p> <ul style="list-style-type: none"> <li>Final art piece should be of original design (No hint of direct copying).</li> <li>Construction/production of final art piece must include at least one digital component.</li> </ul>		
	<p><b>Algebra II:</b></p>			

Unit Learning Targets	<ul style="list-style-type: none"> <li>• LT 3: Creating equations: I can write an equation using given information</li> <li>• LT8: Combining, Composing and Transforming: I can operate with functions</li> </ul> <p>Geometry:</p> <ul style="list-style-type: none"> <li>• LT 2: Transformations: I can perform generic transformations</li> <li>• LT9: Dilations: I can construct and use properties of dilations</li> </ul> <p>Chemistry:</p> <ul style="list-style-type: none"> <li>• I can read the Periodic Table to determine an element's atomic makeup.</li> </ul> <p>English:</p> <ul style="list-style-type: none"> <li>• I can write a narrative to develop real or imagined events using effective technique, details, and well-structured sequence.</li> <li>• I can organize my presentation in a way that the audience can follow.</li> <li>• I can communicate in a style that is appropriate, respectful, and interesting.</li> </ul> <p>History:</p> <ul style="list-style-type: none"> <li>• I can orally introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.</li> <li>• I can orally develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.</li> <li>• I can use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.</li> <li>• I can provide a concluding statement or section that follows from or supports the argument presented.</li> </ul> <p>Spanish:</p> <ul style="list-style-type: none"> <li>• I can use words and complete sentences in Spanish to present a basic description about a piece of art.</li> <li>• I can organize my presentation in a logical way and use Spanish grammar and phonetics correctly, so the hispanic audience can follow along.</li> </ul>
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Vocabulary	<b>Spanish translation</b>	
Math: Algebra II	<ol style="list-style-type: none"> <li>1. Function</li> <li>2. Equation</li> <li>3. Transformation</li> <li>4. Dilation</li> <li>5. Translation</li> <li>6. Series</li> </ol>	<p>función ecuación transformación dilatación traducción serie</p>
Math: Geometry	<ol style="list-style-type: none"> <li>1. Point</li> <li>2. Line</li> <li>3. Plane</li> <li>4. Congruent</li> <li>5. Transformations</li> <li>6. Translations</li> <li>7. Reflections</li> <li>8. Rotations</li> <li>9. Dilation</li> <li>10. Tessellation</li> <li>11. Symmetry</li> </ol>	<p>punto línea plano congruente transformaciones conversiones reflexiones rotaciones dilatación mosaico simetría</p>
Science: Chemistry	<ol style="list-style-type: none"> <li>1. Atomic Number</li> <li>2. Atomic Mass</li> <li>3. Valence Electrons</li> </ol>	<p>número atómico masa atómica valencia de electrones</p>

		<ul style="list-style-type: none"> <li>4. Metal</li> <li>5. Metalloid</li> <li>6. Nonmetal</li> </ul>	<ul style="list-style-type: none"> <li>metal</li> <li>metaloide</li> <li>no metálico</li> </ul>
	Language Arts: English II	<ul style="list-style-type: none"> <li>1. Formal Language</li> <li>2. B-Roll</li> <li>3. Voiceover</li> </ul>	<ul style="list-style-type: none"> <li>lenguaje formal</li> <li>video de fondo</li> <li>sobrevoz</li> </ul>
	Social Studies: U.S. History	<ul style="list-style-type: none"> <li>1. Thesis</li> <li>2. Opposing viewpoint</li> <li>3. Interpretation</li> <li>4. Artistic Value</li> </ul>	<ul style="list-style-type: none"> <li>Tesis</li> <li>Punto de Vista Opuesto</li> <li>Interpretación</li> <li>Valor Artístico</li> </ul>