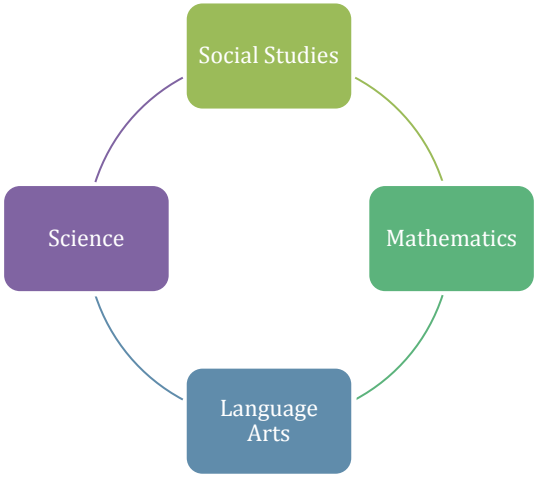
STEM School Chattanooga
10th Grade PBL
Unit Plan Template

Unit 1: Hunter Museum Partnership – Innovating Art



Learning Target Topics

Algebra II: Creating equations

Geometry: Use Euclidean and Transformational Geometry

English II: Conduct research to support an oral argument in defense of artistic value

Chemistry: Describe models of compounds

U.S. History: Present an oral argument in defense of artistic value

Grade Level	10th Grade	Unit Length	9 Weeks
Unit Overview	Students will research two or more art pieces from the Hunter Museum of Art in Chattanooga, TN. They will compare and contrast the historical time periods and influences on the artists and art pieces. They will select one of the researched art pieces to create an original **digital** or **3-D printed piece**. Students will use Algebra II and Geometry to analyze the composition of their chosen art piece. Their selected work will include an assessment of the electron arrangement and a model of the compounds used in the original piece of art.		
Unit Essential Issue	**Problem**: *Redesign a current work of art into a digital or 3-D printed innovative piece.*		
Kick Off, Midterm Events, and Groups	**Kick Off – Thursday, August 20th** 10th grade students and teachers visit the Hunter Museum from 10am to 12pm. Hunter Museum staff provide a tour of the museum. This tour provides students with a basic understanding of the different genres in the museum as well as models the type of discussion/interaction expected of a docent. After the tour, student teams will then move around the museum identifying art pieces they want to use for the PBL. **Practice Run – Thursday, September 24th** 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 Sunday 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. **Student Teams** Students will work in teams of 3-4. The students will choose teams and every team must have at least one Algebra II and one Geometry student.		
Culminating Events	**Deadline Day – Friday, October 2nd** The following items are due to the appropriate content area teacher: • Algebra II: Groups will turn in a pixelated copy of their chosen art piece with an equation, a copy of the chosen art piece with COVM highlighted, and a written explanation in MLA format (combined with Geometry). • Geometry: Students will have posted their answers to EDCITEment lessons on Edmodo, and will turn		

in a Geometric sketch of their chosen art piece and a written explanation in MLA format (combined with Algebra II).

- Chemistry: Students will construct and present in chemistry class models of the compounds used in the original piece using the Quantum Mechanical Model to explain their structure. A written detailed outline of the models will be submitted before presentation.
- English II: Groups will turn in a properly formatted MLA Works Cited with annotations defending their chosen sources. Students will also turn in a written reflection about the project.

Docent Day – Sunday, October 4th

Student teams will come to the Hunter Museum of Art on the first free Sunday in October. 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 one hour.

U.S. History: Students will research two or more art pieces, comparing and contrasting their historical settings and influences. Teams will design an argument for the value of their selected art piece and how their interpretation represents that value. The US History teacher will visit each team for team's US History presentation. A 3-5 minute oral presentation should be ready for US History requirements.

Common Assessment

STEM School Chattanooga

STEM PBL Rubric

PBL Unit: #1 – Hunter Museum
Student: _____
Date: _____

	Advanced	Proficient	Needs Improvement
Math Components: **Algebra II**	✓ An appropriate focal point for the *chosen* piece is highlighted on same copy . ✓ A second copy of the sketch made for the Geometry portion is included in report, highlighting where the COVM and focal point are. ✓ Using the Geometry section of the project as a guide, compositional locations of COVM and focal point are discussed in the technical report. ✓ Technical report discusses the effect the relative locations of these points have on the movement of the viewer's eyes.	✓ Estimate of the center of visual mass (COVM) for the *chosen* piece is reasonable. ✓ Rationale for each part of the equation and its purpose is discussed in technical report. ✓ Range of possible outputs is discussed and appropriately tied to context in technical report. ✓ Pixelated image shows the COVM for each row and column of pixels and the overall COVM for the entire *chosen* piece. Image is included in report.	
Math Components: **Geometry**	✓ A Geometric sketch of the *created* piece is included in report following the same guidelines as for the *chosen* piece. ✓ Technical report is extended to describe the composition of the *created* piece using appropriate Geometric and Artistic vocabulary. ✓ Technical report discusses how the composition and structure of your *created* piece is informed by that of the *chosen* piece.	✓ Lessons 1 & 2 on visual composition from EDCITEment are complete and answers are turned in via Edmodo. ✓ Geometric sketch of *chosen* piece shows contents drawn in black and composition lines in a contrasting color. ✓ Technical report adequately describes and analyzes the composition of your *chosen* piece using appropriate Geometric and Artistic vocabulary discussed in class.	
Science Components: **Chemistry**	✓ A third compound is chosen that must contain a polyatomic ion. ✓ Discuss in a second paragraph for **each** model periodic trends of the cation and anion with respect to: o atomic size o ionization energy o electronegativity ✓ Explain how a polyatomic ion can be a covalently bonded particle but still be electrically charged.	✓ Identify two binary compounds relating to two different materials used in the original art piece. ✓ identify all cations and anions. ✓ Interpret the periodic table to describe the atomic makeup of each element in the ionic compounds. ✓ Develop the Lewis electron-dot structures and the molecular shape for each color ionic compound. ✓ Design and construct models of each compound. ✓ Write a detailed outline explanation for **each** model summarizing the following: o electron distribution o lone and shared pair distribution using orbital diagrams	

			○ valence electrons and their influence on bonding	
	Language Arts Components: **English II**	✓ Relevant data from different high-level sources is used to support the thesis. ✓ Students can discuss and defend their sources and how they are relevant to the project. ✓ The student uses formal language throughout and presents a concise and flowing argument.	✓ Sources are present, yet are present just for the sake of the requirement and do not enhance the information presented. ✓ Formal language is used however the student slips into informal language. ✓ Students use reliable sources but may not be able to defend their reliability.	
	Social Studies Components: **U.S. History**	✓ Thesis is clear and establishes the argument which is fully supported by claims within the argument ✓ The opposing view is stated and considered with full explanation of how the counter-claim falls short ✓ The conclusion establishes a wrap-up of the argument but puts the argument into a larger picture in a socio-economic, political, or cultural aspect.	✓ Thesis is present and establishes the argument. Claims are present. ✓ Opposing view is present but not fully integrated into the argument. You have given the opposing view but it stands alone without any interaction with your viewpoint. ✓ Conclusion wraps up argument.	
	Minimum Requirement Components: **Must be included to be graded**	Algebra II: ✓ Pixelated copy of chosen art piece with an equation of own creation. ✓ Copy of chosen art piece with COVM. ✓ Appropriately formatted technical report, typed and submitted via Edmodo. (combined with Geometry). Geometry: ✓ Answers to EDCITEment lessons posted to Edmodo. ✓ Geometric sketch of chosen art piece. ✓ Appropriately formatted technical report, typed and submitted via Edmodo. (combined with Algebra II). Chemistry: ✓ Oral explanation of one model ✓ Models of two ionic compounds ✓ Written paragraph for each model English II: ✓ MLA formatted Works Cited Page with annotations ✓ Reflection which includes ○ a write up of their project, including their names, STEM connections to the piece, and a summary of their digital recreation ○ An image of their project ○ An answer to the question: Did this project help you to better understand the work of art or to better engage with it? How so? U.S. History: ✓ Presentation must take place at Hunter Museum ✓ Presentation must be between three and five minutes ✓ All group members must speak ✓ All group members must be prepared to answer questions		

Unit Learning Targets	Algebra II: • I can create equations that describe numbers or relationships. • I can reason quantitatively and use units to solve problems. Geometry: • I can experiment with transformations in the plane. • I can apply geometric concepts in modeling situations. Chemistry: • I can represent an atom's electron arrangement in terms of orbital notation, electron configuration notation, and electron dot notation. • I can describe how the quantum mechanical model helps predict the shapes of molecules. English: • I can conduct short or sustained research projects that answer specific questions or solve a problem. • I can synthesize multiple sources (print and digital) and assess credibility and accuracy of those sources. • I can follow a standard format for citation in my work. • I can clearly and concisely present important findings and supporting evidence so listeners can follow the line of reasoning. • I can present information where the organization, development, substance, and style are all appropriate to my purpose.

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I can demonstrate a command of formal English when appropriate.
History:

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.
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.
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.
I can provide a concluding statement or section that follows from or supports the argument presented.

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<tr><td>Vocabulary</td><td>
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<tr><td>Math: Algebra II</td><td>1. Center of Mass
2. Equation</td></tr>
<tr><td>Math: Geometry</td><td>1. Point
2. Line
3. Plane
4. Congruent
5. Transformations
6. Translations
7. Reflections
8. Rotations
9. Dilation
10. Tessellation
11. Symmetry</td></tr>
<tr><td>Science: Chemistry</td><td>1. Anion
2. Cation
3. Electronegativity
4. Hybrid Orbital
5. Ionic Compound
6. Ionization Energy
7. Lone Pair
8. Molecular Shape
9. Quantum Mechanical Model
10. Shared Pair
11. Valence Electrons</td></tr>
<tr><td>Language Arts: English II</td><td>1. Annotated Works Cited
2. Evidence
3. MLA Format</td></tr>
<tr><td>Social Studies: U.S. History</td><td>1. Thesis
2. Opposing viewpoint
3. Logos
4. Logical fallacies
5. Ethos
6. Pathos</td></tr>
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