

Title	Graphic Math Art		
Creator	Cheryl Brown		
Source	GraphicMathArt.wikispace.com https://graphicmathart.wikispaces.com/space/edit		
Project Idea	https://docs.google.com/document/d/1RVX_qRIInS5iINUK1t-zwCH4w2IW5J-GUE_RB73tHs/pub		
Entry Event	You are working with designers in another country with limited internet access and English skills. You will design a graphic art piece for the company's logo and communicate the logo design in an audio file for their team to recreate on any surface.		
Content Standards & Objectives	Objectives Taught or learned through discovery	Learning Outcomes	Evidence of success
	<ul style="list-style-type: none"> • <u>CCSS.MATH.CONTENT.HSF.BF.B.3</u> Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology • <u>CCSS.MATH.CONTENT.HSG.MG.A.1</u> Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* • <u>CCSS.MATH.CONTENT.HSG.MG.A.3</u> Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).* • <u>CCSS.MATH.CONTENT.HSG.GPE.A.1</u> Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. • <u>CCSS.MATH.CONTENT.HSG.GPE.A.3</u> (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. • NCAS 1. Generate and conceptualize artistic ideas and work. • NCAS 2. Organize and develop artistic ideas and work. • NCAS 3. Refine and complete artistic work. 	<p>Identify the graphs of parabolas, circles, ellipses, hyperbolas, linear, and exponential functions</p> <p>Identify parent functions and the translations and dilations needed to create new functions.</p> <p>Identify Geometric shapes and properties to describe objects</p> <p>Solve design problems using geometric methods and physical constraints.</p> <p>Construct equations of parabolas, circles, ellipses and hyperbolas.</p> <p>Write standard form for conic sections.</p> <p>Presentation of sketches of parabola, circle, ellipse and hyperbola.</p> <p>Analyze art and represent using geometric shapes</p> <p>Develop art using mathematical models</p> <p>Communicate artistic rendering</p>	<p>Student will submit graphical renderings of parabolas, circles, ellipses, hyperbolas, linear, and exponential functions</p> <p>Student will submit a written documentation of parabolas, circles, ellipses, hyperbolas, linear, and exponential functions and the objects their composition represents.</p> <p>Student will submit the functions and identify the physical constraints necessary to create the object</p> <p>Student will use graphing technology to submit drawings of parabolas, circles, lines, hyperbolas that are evident in the ____ they are creating.</p> <p>Students will present a podcast which provides explicit instructions for recreating their graphic design on a larger surface.</p> <p>Students will achieve a passing score on quizzes which cover determining forms and equations of parabolas, circle, ellipse, and hyperbola.</p>
ISTE Standards	Creativity & Innovation	Teaching Strategies	Evidence of success

	<ul style="list-style-type: none"> a. Apply existing knowledge to generate new ideas, products, or processes b. Create original works as a means of personal or group expression c. Use models and simulations to explore complex systems and issues 	<p>The teacher models how to analyze an object to discover the shape decomposition.</p> <p>The teacher provides opportunities for creativity.</p> <p>The teacher models how to explore a model of a piece of art work in Desmos calculator.</p>			
	<p>Communication and Collaboration</p> <ul style="list-style-type: none"> a. interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats 	<p>The teacher will present group contracts, guidelines and assessment rubrics.</p> <p>The teacher will provide information on the creation of multimedia and digital learning environment.</p>	<p>Student groups make a brainstorming plan to reach goals.</p> <p>Students will make a checklist of progress using technology.</p> <p>Each student will discuss and sign a collaborative agreement.</p> <p>Each student will assess the participation of other members and provide self-reflection.</p>		
	<p>Research and Information Fluency</p> <ul style="list-style-type: none"> a. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media b. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks 	<p>The teacher will guide students to locate effective sources and media.</p>	<p>Each student will search for valid information online as well as practice mathematical skills.</p> <p>Each student will present evidence of internet searches and site resources.</p>		
	<p>Critical thinking and problem solving</p> <p>Plan and manage activities to develop a solution or complete a project</p>		<p>Students will create a self-checklist of progress using technology</p>		
Performance Objectives	<p>Know</p> <p>The student will know how to derive the equation of a line, exponential function, parabola, circle, ellipse, or parabola.</p> <p>The student will know how to graph the equation of a line, exponential function, parabola, circle, ellipse, or parabola and identify the transformation from the parent function.</p> <p>The student will know how to identify each type of conic section from the standard form of their equation.</p>				

The student will be able to model shapes using geometric functions.
 The students will know how to apply constraints to functions to satisfy physical constraints.
Do
 The student will derive the equation of a circle given the center and the radius using the Pythagorean theorem.
 The student will write the standard form of a parabola.
 The student will derive the equation of an ellipse, and hyperbola given the foci.
 The student will graph a line, ellipse, parabola, hyperbola, and a circle.

Driving Question How does math help us represent art on a coordinate plane?

Assessment plan Rubric- Each team member will create their own design, but the designs can coordinate for the company. Each visual will include a descriptive narrative which includes algebraic expressions and coordinate axes. Each image must contain a line, parabola, circle, ellipse, hyperbola and at least two colors with shading. Elements to consider: catchy logo, professional audio communication, and accurate representation. Students should create the graphic art and podcast using 21st century technology.

Graphic Art DLE- Each team will create a graphical representation of a logo.

Major Group Projects	Artist rendering-rubrics	
Major Individual Projects	Drawing and recording - rubrics	
Rubrics	Collaboration: Collaboration rubric	Audio recording rubric:
	Critical Thinking & Planning	Content knowledge
Other assessments	Quizzes	Conics identification-quiz
	Self-evaluation Reflection	Peer evaluation Check in #1 http://goo.gl/forms/Cmk0l4YXd2
	Online tests/Exams	Logo Creation http://goo.gl/forms/NQKT5a8Qpi

Assessment and reflection

Answer: What is graphic art: <http://www.aiga.org/guide-whatisgraphicdesign/>

Map the Product	Knowledge and Skills Needed	Already Learned	Taught through the project
	1. Derive the equation of a linear and exponential functions.		
	2. Identify the graph of a linear and exponential functions.	X	
	3. Derive the equation of a line, exponential function, parabola, circle, ellipse, or parabola.		X
	4. Identify the graph of a line, exponential function, parabola, circle, ellipse, or parabola.		X
	5. Sketch the graph of a parabola, ellipse, circle and hyperbola.		X
	6. Graph inequalities of a variety of functions.		X
	7. Explore and solve equations using circles.		X

	8. Use Desmos calculator.	x	
	9. Use and share Google Docs	x	
	10. Use audacity and USB drive		x
	11. Graph a composite image		x
Resources	<p>School – based individuals Technology lab instructor</p> <p>Technology: Internet Microphones Audacity Desmos accounts Server folders/usb drives Sound Cloud accounts</p> <p>Materials: Art boards Paint/markers Worksheet: https://docs.google.com/document/d/1RVX_qRIInS5iINUK1t-zwCH4w2IW5J-GUE_RB73tHs/pub</p>		
Resources	<p>http://www.nationalartsstandards.org/sites/default/files/NCCAS%20%20Conceptual%20Framework_0.pdf http://www.corestandards.org/Math/Content/HSG/GPE/ https://www.iste.org/docs/pdfs/20-14_ISTE_Standards-S_PDF.pdf https://www.desmos.com/calculator/mq1vnnhrih</p>		