	ARTS IN MOTION CHARTER SCHOOL| 10th Grade Math II CURRICULUM MAP				
Projects	**Essential Questions**	**Enduring Understandings**	**Math Concepts**	**CCSS**	**Final Product**
Quadratic Functions	● How is quadratic growth different than linear or exponential growth? ● How can we use quadratic functions to model situations and solve problems?	● Quadratic functions have key features that can be interpreted in context: intercepts, relative maxima, and minima, domain and range, symmetries, intervals where the function is increasing and decreasing, end behavior and average rate of change. ● A quantity increasing exponentially eventually exceeds a quantity increasing as a polynomial function. ● Functions that models the relationship between two quantities can involve more than one function type. ● Building functions that model quantitative relationships involve assumptions, limitations, and estimations. ● Explicit and recursive functions can model a relationships between two quantities in context.	● Create Models ● Interpret Functions	● CCSS.MATH.CONTENT.HSF.BF.A.1 ● CCSS.MATH.CONTENT.HSF.IF.B.4 ● CCSS.MATH.CONTENT.HSF.IF.B.5 ● CCSS.MATH.CONTENT.HSF.IF.B.6 ● CCSS.MATH.CONTENT.HSF.LE.A.3	● Performance Task
Structure of Expressions	● How can quadratic expressions be written in equivalent forms? ● Why are equivalent forms of quadratic expressions useful?	● Graphs can be transformed by manipulating the equation f(x) with f(x) + k, f(x + k), kf(x), and f(kx). ● Functions that are represented differently can be compared. ● Quadratic functions can be written in equivalent forms by factoring or completing the square to reveal zeros, extreme values, and symmetry. These equivalent forms are called standard form, vertex form, and factored form.	● Analyze Functions ● Create Models ● Quadratic Expressions	● CCSS.MATH.CONTENT.HSA.SSE.B.3 ● CCSS.MATH.CONTENT.HSF.IF.C.7 ● CCSS.MATH.CONTENT.HSF.IF.C.8 ● CCSS.MATH.CONTENT.HSF.IF.C.9 ● CCSS.MATH.CONTENT.HSF.LE.A.3	● Performance Task ● Structures of Expressions Performance Task
Exponential and other ExpressionS	● How can we apply what we know about quadratic functions to "other functions?" ● What are the relationships between various types of functions and the behaviors of the functions?	● Exponential expressions can be written in equivalent forms using the properties of exponents. ● Square root, cube root, piecewise-defined, and absolute value functions have identifying key features when graphed. ● Graphs can be transformed by manipulating the equation f(x) with f(x) + k, f(x + k), kf(x), and f(kx).	● Analyze Functions ● Create Models ● Create from Existing Functions ● Exponential Expressions	● CCSS.MATH.CONTENT.HSA.SSE.A.2 ● CCSS.MATH.CONTENT.HSA.SSE.B.3 ● CCSS.MATH.CONTENT.HSF.BF.A.1 ● CCSS.MATH.CONTENT.HSF.BF.B.3 ● CCSS.MATH.CONTENT.HSF.IF.C.7 ● CCSS.MATH.CONTENT.HSF.IF.C.8 ● CCSS.MATH.CONTENT.HSF.IF.C.9 ● CCSS.MATH.CONTENT.HSF.LE.A.3 ● CCSS.MATH.CONTENT.HSN.RN.A.1 ● CCSS.MATH.CONTENT.HSN.RN.A.2	● Performance Task
Function Art	● How can we use mathematical functions to create a	● Students will demonstrate a deep understanding of the features and properties of the graphs of a variety of	● Critiquing the Reasoning of Others ● Making Connections	● CCSS.ELA-LITERACY.CCRA.R.1 ● CCSS.MATH.CONTENT.HSF.BF.B.3 ● CCSS.MATH.CONTENT.HSF.IF.C.7	● Function Art

	piece of art that is meaningful to ourselves and others?	mathematical functions, as well as their knowledge of transformations of functions.	& Inferences • Precision	• CCSS.MATH.PRACTICE.MP6	
Quadratic Equations	• Why are there different methods of solving quadratic equations? • How does the structure of an expression relate to solving a quadratic equation set to 0?	• The structure of quadratic expressions have meaning. • There are many different ways to solve a quadratic equation. • When quadratic equations are used to model problems there are assumptions, limitations, and estimations involved. • Solving quadratic equations can involve complex roots, where i^2= -1.	• Analyze Functions • Create Equations • Quadratic Expressions • Solving	• CCSS.MATH.CONTENT.HSA.CED.A.1 • CCSS.MATH.CONTENT.HSA.CED.A.2 • CCSS.MATH.CONTENT.HSA.CED.A.4 • CCSS.MATH.CONTENT.HSA.REI.B.4 • CCSS.MATH.CONTENT.HSA.SSE.B.3 • CCSS.MATH.CONTENT.HSF.IF.C.7 • CCSS.MATH.CONTENT.HSF.IF.C.8 • CCSS.MATH.CONTENT.HSF.IF.C.9 • CCSS.MATH.CONTENT.HSN.CN.A.2 • CCSS.MATH.CONTENT.HSN.CN.C.7	• Performance Task
Similarity and Right triangles	• How are similarity and right triangle trigonometry related? • How can right triangle trigonometry be useful in solving real-world problems?	• Similar figures have congruent angles and proportional sides. • If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar (AA criterion). • Side ratios in right triangles are properties of an angle rather than of a triangle; these trigonometric ratios are called “sine,” “cosine,” and “tangent.” • The Pythagorean Theorem and trigonometric ratios can be used to solve problems involving right triangles where there is a missing side or angle.	• Right Triangle Trigonometry • Similarity	• CCSS.MATH.CONTENT.HSG.SRT.A.1 • CCSS.MATH.CONTENT.HSG.SRT.A.2 • CCSS.MATH.CONTENT.HSG.SRT.A.3 • CCSS.MATH.CONTENT.HSG.SRT.B.4 • CCSS.MATH.CONTENT.HSG.SRT.B.5 • CCSS.MATH.CONTENT.HSG.SRT.C.6 • CCSS.MATH.CONTENT.HSG.SRT.C.7 • CCSS.MATH.CONTENT.HSG.SRT.C.8	• Performance Task
Circles and Conic Sections	• How can we and why do we represent conic sections both algebraically and graphically? • How can we prove properties of circles?	• Conic sections are shapes found from slicing a plane through a cone, and can be represented both algebraically and geometrically. • Derivation helps us generalize and apply our understanding in new contexts. • Circles have predictable, and provable, properties. • The value of pi can be found using limits.	• Circles • Conic Sections	• CCSS.MATH.CONTENT.HSG.C.A.1 • CCSS.MATH.CONTENT.HSG.C.A.2 • CCSS.MATH.CONTENT.HSG.C.A.3	• Performance Task

ARTS IN MOTION CHARTER SCHOOL| 10th Grade Math II UNIT PLAN	
Project	Quadratic Functions
Suggested Time	• 5 Weeks
Essential Questions	• How is quadratic growth different than linear or exponential growth? • How can we use quadratic functions to model situations and solve problems?
Enduring Understandings	• Quadratic functions have key features that can be interpreted in context: intercepts, relative maxima, and minima, domain and range, symmetries, intervals where the function is increasing and decreasing, end behavior and average rate of change. • A quantity increasing exponentially eventually exceeds a quantity increasing as a polynomial function. • Functions that models the relationship between two quantities can involve more than one function type. • Building functions that model quantitative relationships involve assumptions, limitations, and estimations. • Explicit and recursive functions can model a relationships between two quantities in context.
Math Concepts	• Create Models • Interpret Functions
Focus Areas	• Polynomial Expressions • Quadratic Expressions
	• CCSS.MATH.CONTENT.HSF.BF.A.1 • CCSS.MATH.CONTENT.HSF.IF.B.4 • CCSS.MATH.CONTENT.HSF.IF.B.5 • CCSS.MATH.CONTENT.HSF.IF.B.6

CCSS	• CCSS.MATH.CONTENT.HSF.LE.A.3
Checkpoints	• Neither Exponential or Linear • Visual Patterns and Quadratic Sequences • Equivalent Forms of Quadratic Functions • Linear, Exponential, and Quadratic Growth • Modeling with Quadratic Functions 1
Final Product	• Performance Task (Teacher choice)

ARTS IN MOTION CHARTER SCHOOL| 10th Grade Math II LESSON PLAN					
Project	Quadratic Functions	**Essential Questions**	• How is quadratic growth different than linear or exponential growth? • How can we use quadratic functions to model situations and solve problems?	**Final Product**	• Performance Task

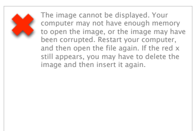
Checkpoint	• Neither Exponential or Linear
Cognitive Skills	• Create Models • Interpret Functions
Objective	• Find a function to model a linear and quadratic relationship through a given set of points.
Activities	• (Checkpoint)
Resources	• Finding Functions (Sample linked) • I Rule! • Fall of Javert

Assessment	• Performance task assessment using cognitive skills (See attached Sample)

Name:____Block:___
____

Checkpoint 1: Neither Linear nor Exponential

Use the following figure pattern to answer questions 1-3.



1. Assuming the pattern continues, draw the next figure in the sequence. In your own words, explain the pattern.

2. How many blocks will be in Figure 10? How did you figure this out?

3. Explain why this pattern shows quadratic growth.

4. Examine the sequence of figures and find a rule or formula for the number of tiles in any figure number.

5. Examine the sequence of figures **below**. How many squares would Figure 10 have? Figure 100? What rule or pattern did you use to figure this out?

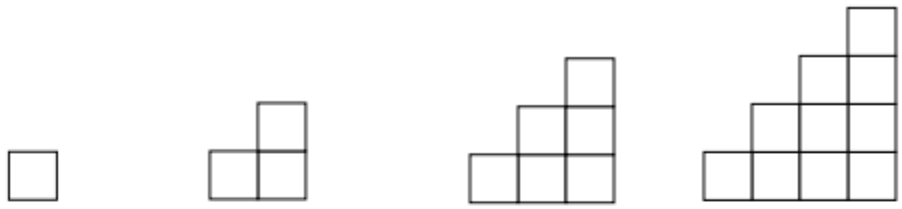


Figure 1 Figure 2 Figure 3 Figure 4

Adapted from The Mathematics Vision Project