IM 2 Unit 2 Plan 2023 - 2024

Course: IM 2	Unit: 2 - Quadratic Functions
Time: 19 Days (Aug 31-Sep 27)	**Essential Standards:** A.SSE.3a, A.SSE.3b, F.IF.4, F.IF.6, F.IF.7, F.IF.9

Previous Standard:	**Future Standard:**
8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	F.TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Standards for Mathematical Practice:	**Student Learning Targets:**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	1. **I can** interpret key features of graphs and tables of quadratic functions. (F.IF.4, F.LE.6) 2. **I can** sketch or graph quadratic functions showing key features. (F.IF.4, F.IF.7a) 3. **I can** factor quadratic expressions and complete the square.(A.SSE.3a and A.SSE.3b) 4. **I can** calculate, estimate, and interpret the average rate of change of a function over a specified interval. (F.IF.6) 5. **I can** compare properties of two functions each represented in a different way. (F.IF.9, F.LE.3) (Important to know) 6. **I can** relate the domain of a function to its graph and to a real-world situation. (F.IF.5) 7. **I can** find and interpret zeros, extreme values, and symmetry of a quadratic function. (F.IF.8a)

	8. **I can** identify transformations of functions and recognize even/odd functions. (F.BF.3)

Standards	Vocabulary	Skills	Activities (Resources)	Assessment
Essential Standard ★Indicates a modeling standard linking mathematics to everyday life, work, and decision-making				
A.SSE.3a★ **Factor a quadratic expression to reveal the zeros of the function it defines** **A.SSE.3b★** **Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines**	Quadratic expression Zeros Complete the square maximum minimum	▪ Find the zeros, x-intercepts, roots, solutions or roots. ▪ Find the zeros,x-intercepts, solutions or roots of a quadratic equation by using factoring ▪ complete the square ▪ Find the vertex	MGH 1-10, MGH Ch. 2 Lessons 1, 2, 3, 4, 5 including Ext 2-1 Algebra Lab (Rate of Change of A Quad. Func), Ext 2-3 (Systems of Lin. & Quad. Eqs), and Ext 2-4 (Finding the Max or Min. Value) Chapter 3, lesson 4 Click here to see sample SBAC question(s)	CFA with targets assessed or link to assessment Link to end of unit assessment
F.IF.4★	Function	▪ Interpret key features of graphs and tables	MGH 2-1, 2-3	

For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.	Relationship between two quantities Key features ▪ Intercepts ▪ Intervals ▪ Positive/negative function value ▪ maximum/minimum ▪ Increasing/decreasing Graphs Tables Verbal description	▪ sketch graphs showing key features	*Supplementation needed to interpret key features of given graphs and tables*	
F.IF.6★ **Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.**	average rate of change	▪ Calculate average rate of change from a formula or graph ▪ Interpret average rate of change in context of a problem ▪ Estimate average rate of change from a graph	MGH 2-1 Extend *Supplementation needed* Click here to see sample SBAC question(s)	
F.IF.7★ **Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.** **a. Graph ~~linear and~~ quadratic functions and show intercepts, maxima, and minima.**	system of linear and quadratic functions	▪ Graph quadratic functions ▪ Show intercepts, maxima, and minima on graphs of quadratic functions	MGH 2-1, 2-3 Click here to see sample SBAC question(s)	

F.IF.9 **Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.**	Quadratic transformations Quadratic vs exponential growth (exponential growth wins)	▪ comparing functions	*Supplementation needed* Click here to see sample SBAC question(s)	
Important to Know Standard ★Indicates a modeling standard linking mathematics to everyday life, work, and decision-making				

F.IF.5★
Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes
	Domain
	range
	axis of
	  symmetry
	maximum
	minimum
	zeros
	roots
	solutions
	y- intercepts
	x-intercepts
	quadratic
	  transformations
	stretch
	compress
	reflection
		▪ determine the domain and range		

F.IF.8a Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the	factoring completing the square zeros	▪ Find the zeros, x-intercepts, roots and solutions ▪ Find the vertex		

graph, and interpret these in terms of a context	roots
	solutions
	axis of
	  symmetry
	maximum
	  values
	minimum
	  values			

F.BF.3
Identify the effect on the graph of replacing f(x) by f(x) + k, kf(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. Include recognizing even and odd functions from their graphs and algebraic expressions for them
	quadratic
	  transformati
	  on
	stretch
	compress
	reflect
		▪ Graph and describe
		  transformations		

F.LE.3★
Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function
	linear
	  behavior
	quadratic
	  behavior
	parabola
		▪ compare graphs		

F.LE.6★
Apply quadratic functions to physical problems, such as the motion of an object under the force of gravity
	physical
	  problems
	real life
	  problems
		▪ Use quadratic functions
		  to solve real world
		  problems		

Reflection: *List strategies or 'things to remember" when teaching when planning the unit. After the unit, document what worked well and what needs to change for the next year.*

Axis of symmetry is the average of the 2 x-intercepts!

Graphing Quadratics (1,3,5 method) https://www.youtube.com/watch?v=5guQKu9wJt0
Converting standard form to vertex form by finding the vertex using -b/2a
Can be helpful to use b/-2a instead to help them to
put y=a(x-h)^2+k into desmos and use sliders

Calendar

Monday	Tuesday	Wednesday	Thursday	Friday
Date I can… Focus (skill or daily objective students will learn for the day)				

*Identify dates for CFAs and end of unit assessments on the calendar.

Revised December 2023