(DISTRICT-DEVELOPED SAMPLE SGO for Functions & Modeling- MATHEMATICS; *1 of 1*)

Name	School	Grade	Course/Subject	Number of Students	Interval of Instruction
			Functions & Modeling (Critical Area)		Sept. 2018– April. 2018

Standards, Rationale, and Assessment Method

The 2018 – 2019 student growth objectives continue to place emphasis on the critical mathematics content (or the Big Rocks) for each grade. Focus on the Big Rocks of each grade opens up time and space to bring the Standards for Mathematical Practice to life in mathematics instruction; placing an emphasis on sense-making, reasoning, arguing and critiquing, modeling, etc. The growth objectives also seek to identify gaps in student understandings such to "fill" the gaps with targeted instructional supports.

Focus is critical to ensure that students learn the most important content completely, rather than succumb to an overly broad survey of content. When students are taught with understanding, there will be less need to reteach concepts from year to year. Instead, content is revisited as connections are made to new content-- first with concepts and then with procedures. This is accomplished through a focused curricular approach. When fewer topics are addressed in a given grade or course, those topics can be taught coherently and with rigor.

The following College Board standards have been selected because they are major focus standards for the first year college calculus content cross nation. In addition, all eight mathematical practice standards are aligned to each standard listed on this SGO to support students develop their critical thinking skills as a preparation for students' college math courses.

Standards:

A.CED.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A.CED.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

A.REI.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

A.REI.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A.REI.11: Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

A.SSE.1: Interpret expressions that represent a quantity in terms of its context.

F.IF.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*).

F.IF.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

F.IF.4: 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.

F.IF.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*

F.IF.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple c cases and using technology for more complicated cases

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude

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.

F.LE.5: Interpret the parameters in a linear or exponential function in terms of a context

F.BF.1: Write a function that describes a relationship between two quantities

Focused Mathematical Practice Standards:

- ✓ *MP1: Make sense of problems and persevere in solving them*
- ✓ *MP2: Reason abstractly and quantitatively*
- ✓ *MP3: Construct viable arguments and critique the reasoning of others*
- ✓ *MP4: Model with mathematics*
- ✓ *MP7: Look for and make use of structure*
- ✓ *MP8: Look for and express regularity in repeated reasoning*

Assessment Method: *An end of year common Summative Assessment will be used to measure students' growth. Summative Assessment incorporates carefully selected practice-forward tasks that reflect higher levels of cognitive complexity.*

Starting Points and Preparedness Groupings

Student tiers will be determined using the following data:
2017-18 PARCC
2017-18 Spring NWEA

Preparedness Group	Baseline Score (Percentile)
Tier 1	< 0.35
Tier 2	0.35 – 0.55
Tier 3	0.55 – 0.75
Tier 4	> 0.75

Student Growth Objective

Growth Goal : By April 2019, 80% of students in each preparedness group will meet or exceed their assigned target command level for full attainment of the objective as shown in the scoring plan {Tier 1⇨ Level 2; Tier 2 ⇨ Level 3; Tier 3 ⇨ Level 4; Tier 4 ⇨ Level 4 or 5; } as measured by the 2017-2018 Mathematics Summative Assessment.

Preparedness Group (e.g. 1,2,3)	Number of Students in Each Group	Target Command Level Summative
Tier 1		2
Tier 2		3
Tier 3		4
Tier 4		4 or 5[1]

Scoring Plan

Objective 1: Based on End-of-Year Summative Assessment (Modeling Questions)

Preparedness Group	Student Target Command Level	Teacher SGO Score Based on Percent of Students Achieving Target Score			
		Exceptional (4) **>80%**	Full (3) **79-80%**	Partial (2) **50-78%**	Insufficient (1) **<50%**
Tier 1	2				
Tier 2	3				
Tier 3	4				
Tier 4	4 or 5				

[1] It is expected that students in Tier 4 maintain a level of strong command or grow to distinguished command.

Approval of Student Growth Objective

Administrator approves scoring plan and assessment used to measure student learning.

Teacher _____ Signature_____	Date Submitted_____
Evaluator _____ Signature _____	Date Approved _____

Results of Student Growth Objective Based on End-of-Year Summative Assessment

Summarize results using weighted average as appropriate. Delete and add columns and rows as needed.

Preparedness Group	Students at Target Score	Teacher SGO Score	Weight (based on students per group)	Weighted Score	**Teacher SGO Score**
Tier 1					
Tier 2					
Tier 3					
Tier 4					

Notes

Describe any changes made to SGO after initial approval, e.g. because of changes in student population, other unforeseen circumstances, etc.

Review SGO at Annual Conference

Describe successes and challenges, lessons learned from SGO about teaching and student learning, and steps to improve SGOs for next year.

Teacher _____ Signature _____ Date _____

Evaluator _____ Signature _____ Date _____