

## Student Growth Objective Form

(DISTRICT-DEVELOPED SAMPLE SGO for Pre-Calculus- MATHEMATICS; 1 of 1)

Name	School	Grade	Course/Subject	Number of Students	Interval of Instruction
			Pre- Calculus		Sept. 2018– April. 2019

### 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 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.*

#### **Pre-calculus Standards:**

**N.CN.3.** Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.

**N.CN.8.** Extend polynomial identities to the complex numbers. For example, rewrite  $x^2 + 4$  as  $(x + 2i)(x - 2i)$ .

**N.CN.9.** Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

**A.APR.6.** Rewrite simple rational expressions in different forms; write  $a(x)/b(x)$  in the form  $q(x)+r(x)/b(x)$ , where  $a(x)$ ,  $b(x)$ ,  $q(x)$  and  $r(x)$  are polynomials with the degree of  $r(x)$  less than the degree of  $b(x)$  using inspection, long division, or, for the more complicated examples, a computer algebra system.

**A.APR.7.** Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication and division by a nonzero rational expression; add, subtract, multiply and divide rational expressions.

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

**F.BF.4.** Find inverse functions.

**F.BF.5.** Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

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

**F.LE.4.** For exponential models, express as a logarithm the solution to  $ab^{ct} = d$  where  $a$ ,  $c$ , and  $d$  are numbers and the base  $b$  is 2-10, or  $e$ ; evaluate the logarithm using technology.

**F.TF.3.** Use special triangles to determine geometrically the values of sine, cosine, tangent for  $\frac{\pi}{3}$ ,  $\frac{\pi}{4}$ , and  $\frac{\pi}{6}$  and

use the unit circle to express the values of sine, cosines, and tangent for  $x$ ,  $\pi + x$ , and  $2\pi - x$  in terms of their values for  $x$ , where  $x$  is any real number.

**F.TF.4.** Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

**F.TF.9.** Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

**G.C.4.** Construct a tangent line from a point outside a given circle to the circle.

*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 <sup>1</sup>

### Scoring Plan

Objective 1: Based on End-of-Year Summative Assessment

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				

<sup>1</sup> 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 \_\_\_\_\_