Curriculum Sample Template
Max. 8 Pages

Grade Level	High School	**Content Area**	Math
Course Title (grades 9-12 Only)	Pre Calculus		
Length of Unit	3 Days	**Time of Year**	1st quarter
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Students can verify by composition that one function is the inverse of another (F-BF.4.b). Students can ,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 (F-LE.4) Students work through standards of mathematical practice in every mathematics lesson throughout the year.		
Alignment to Program of Instruction *Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.*	The following methods of instruction are aligned to the program of instruction: *RTI*: Notes in CLOZE form are provided for Tier 2 and Tier 3 students as needed. Teacher will organize small group guided instruction for students as needed. Teacher will re-teach objectives focusing on multiple learning styles (verbal, visual, kinesthetic, etc.) as needed. *What Works Strategies*: Objectives are clearly communicated to students at the beginning of every lesson. Cooperative learning is used regularly in lessons emphasizing the thought process used as problems are solved (think-alouds). Homework is assigned for independent practice. Students will regularly receive criterion-referenced, timely and specific feedback on their performance. *SIOP*: Students regularly work with partners and small groups. Scaffolding involves significant teacher modeling and guided practice. Students will verbalize their thought processes as related to the problems they have solved (think-alouds). Notes in CLOZE form are provided for students as needed. When appropriate, mathematics vocabulary will be broken down and analyzed to help with comprehension of unfamiliar terms (e.g.: logarithm, etc.) *Culturally Relevant Pedagogy*: Students will solve real-world problems that include topics relevant to them and their community.		
Standard Number and Description *List the Number* and full description for the required Standard.*	F-BF.5 - Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.		
Summative Assessment	The summative assessment for this objective is in the form of a quiz. Students will demonstrate their knowledge of the inverse relationship between exponents and logarithms to solve problems involving		

	logarithms and exponents.
Scoring Scale and Mastery Level	The summative assessment will be scored using an answer key. Each of the five questions is assigned a point value. Mastery is demonstrated with a score of 80% or above. A score of 20 = 100%, a score of 19 = 95%, a score of 18 = 90%, a score of 17 = 85%, a score of 16 = 80%, a score of 15 = 75%, etc.
Materials/Resources Needed	Textbook (*Prentice Hall, *Precalculus*), notes in CLOZE form, homework starters for Tier 3 students. **Note: 2013-2014 Pearson textbooks, as mentioned in A.3 Program of Instruction, were not available at time of planning and publication, so earlier editions of Pearson/Prentice Hall textbooks were used.*

	Instruction	Student Activities
1	Objective: Students understand that e^x and ln(x) are inverse functions using the composition of two functions test: two functions are inverses if (f of $^{-1}$) (x) = x. 1) Teacher reads objective aloud to students. 2) Teacher introduces and models how to solve exponential and logarithmic equations and uses properties of inverse functions to solve for a variable. Teacher models correct use of vocabulary and verbalizes the thought process used to calculate solutions (think alouds). 3) Teacher provides students with problems in which they solve exponential and logarithmic functions and use the properties of inverse functions to solve for a given variable. 4) Teacher facilitates classroom discussion on given examples and shares observations when appropriate. 5) Teacher assigns homework: Students are problems in which they solve exponential and logarithmic functions and use properties of inverse functions to solve for a variable. (Additional problems will be made available for enrichment when appropriate for individual students.)	1) Students follow along with teacher and write objective into their notes. (A set of notes in CLOZE form are provided to students identified as needing them, Tier 3 and some Tier 2.) 2) Students write examples in their notes and ask clarifying questions as needed. 3) Students discuss and solve given problems with their partners. 4) Pairs of student volunteers present their solutions to the class, focusing on correct use of vocabulary and verbalizing their thought processes (think alouds). 5) Students complete homework problems independently. (For Tier 3 students, the first three problems will be in hand-out form with the first problem completed and the next two problems partially completed.)

2	Objective: Students can solve equations involving exponential and logarithmic functions. 1) Teacher instructs students to check their homework with their table groups (4 students). Teacher actively roams around the classroom monitoring discussions and making notes of any observations to be shared with the class. 2) Teacher facilitates whole-class discussion about individual homework problems, if necessary, asking for volunteers to share their solutions/thought processes with the class. Teacher shares observations when appropriate. 3) Teacher reads objective aloud to students. 4) Teacher models problem solving strategies incorporating inverse functions. Teacher models correct use of vocabulary and verbalize the thought process used to calculate solutions (think alouds). 5) Teacher provides students with problems in which they are to solve problems incorporating inverse functions. Teacher actively roams around the classroom monitoring discussions and making notes of any observations to be shared with the class. 6) Teacher facilitates classroom discussion on given examples and shares observations when appropriate. 7) Teacher assigns homework: Students are provided problems in solve incorporating inverse functions. (Additional problems are available for enrichment, when appropriate, for individual students.)	1) Students cooperatively share their answers. They discuss any solutions that they did not agree on and attempt to come to a group consensus on the solutions to these problems. If there is a solution they do not agree on, they will note that problem to share with the whole class to see if someone else in the room can explain/model the solution. 2) Selected students share their solutions/thought processes if needed. Students are the teachers at this point. 3) Students follow along with teacher and write objective into their notes. (A set of notes in CLOZE form are provided to students identified as needing them, Tier 3 and some Tier 2.) 4) Students write examples in their notes and ask clarifying questions as needed. 5) Students discuss and solve given problems with their partners. 6) Pairs of student volunteers present their solutions to the class, focusing on correct use of vocabulary and verbalizing their thought processes (think alouds). 7) Students complete homework problems independently. (For Tier 3 students, the first three problems will be in hand-out form with the first problem completed and the next two problems partially completed.)
3	Objective: Students will demonstrate understanding of the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. 1) Teacher instructs students to check their homework with their table groups (4 students). Teacher actively roams around the classroom monitoring discussions and making notes of observations to be shared with the class. 2) Teacher facilitates whole-class discussion about individual homework	1) Students cooperatively share their answers. They discuss any solutions that they did not agree on and attempt to come to a group consensus on the solutions to these problems. If there is a solution they do not agree on, they will note that problem to share with the whole class to see if someone else in the room can explain/model the solution. 2) Selected students share their solutions/thought processes if

	problems, if necessary, asking for volunteers to share their solutions/thought processes with the class. Teacher shares observations when appropriate. 3)Teacher gives summative assessment.	needed. Students are the teachers at this point. 3) Students complete summative assessment.

Paste Summative Assessment Here:

Quiz – Exponents and Logarithms

Solve each equation below for x.

1. $e^x = 2$

2. $\ln x - \ln 4 = 0$

3. $e^x + 3 = 4$

4. $\ln x = 1$

5. $\ln x + \ln(x + 2) = 0$

Paste Answer Key/Scoring Rubric Here:

Quiz – Exponents and Logarithms – ANSWER KEY

Mastery is determined by 80% or above.

Quiz is worth 20 points. Each problem is worth four points.

1. $\ln(2)$ 2. $x = 4$ 3. $x = 0$ 4. $x = e$ 5. $x = 1 + \sqrt{2}$