Python Coding – Radical & Rational F(x)s and Trig Length: 6 Weeks

STEM SCIENCE TECHNOLOGY ENGINEERING MATH	**Mathematics Unit Plan**	
Teacher: Hill	Grade: 10	Course: Algebra 2

Unit Title: Python Coding – Radical and Rational F(x)s and Trigonometry

LEARNING TARGETS

LT 4: I can use the structure of an expression to identify ways to rewrite it. (CCSS.A.SSE.2)
LT 8: I can rewrite expressions involving radicals and rational exponents using the properties of exponents. (CCSS. HSN.RN.A.2)
LT 9: I can solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.. (CCSS.REI.A.2)
LT 10: I can extend the domain of trigonometric functions using the unit circle. (CCSS. F.TF.A.1,2,3)
LT 11: I can model periodic phenomena with trigonometric functions. (CCSS. F.TF.B.5)

UNIT OVERVIEW — **Overall summary of the unit, activities, tasks, and/or content.**

Students will review multiplying and factoring polynomials to re-engage their background knowledge. After review, students will learn to write, rewrite, and solve radical and rational functions. Finally, students will extend their knowledge of trigonometric functions through the use of the unit circle and use their knowledge of the unit circle's properties and characteristics to develop python code that will convert any given element of the unit circle to its respective units.

MOTIVATORS — **Hooks for the unit and supplemental activities. (PBL scenarios, video clips, websites, literature)**

Students will be introduced to the Math Design Collaborative (MCD) "Manipulating Radicals" to practice using "the properties of exponents, including rational exponents, and manipulate algebraic statements involving radicals" and to learn "to discriminate between equations and identities." After completing rational and radicals, students will be introduced to the Mazer Tag game in which they will learn about the use of trigonometry and reflections to have lasers hit a target with obstacles in the way.

Week	Learning Targets	Materials & Resources	Instructional Procedures	Differentiated Instruction	Assessment
1-3	LT 4: I can use the structure of an expression to identify ways to rewrite it. (CCSS.A.SSE.2) LT 8: I can	**Materials** - Polynomial Puzzler from Illuminations: http://illuminations.nctm.org/Lesson.aspx?id=2938 - Review activity to "reinforce their knowledge about multiplying	**Essential Questions** How do you identify, rewrite, and solve radical and rational functions? **Set** Student will upload polynomial puzzler activity sheet and complete on their iPads. The activity will re-engage their knowledge on multiplying monomials and binomials and factoring trinomials.	**Remediation** - Lesson Intervention (from HMH 5.1-5.8) **Enrichment** -Polynomial and	**Formative Assessments:** -Homework -MDC activity

	rewrite expressions involving radicals and rational exponents using the properties of exponents. (CCSS. HSN.RN.A.2) LT 9: I can solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.. (CCSS.REI.A.2)	monomials and binomials, and factoring trinomials." - MDC – Manipulating Radicals http://map.mathshell.org/materials/lessons.php?taskid=547&subpage=concept - MDC – printouts, need to be cut prior to activity - Asymptote Bingo http://www.epsilon-delta.org/2013/03/asymptote-bingo.html - Exploring Rational Functions Lecture Notes http://www.epsilon-delta.org/2012/03/exploring-rational-functions.html - Rational Function Foldable http://www.epsilon-delta.org/2013/04/my-unit-on-rational-functions-algebra-ii.html **iPad Apps** HMH Fuse App: Algebra 2 Common Core **Equipment** - iPad - mini white boards - dry erase markers	**Teaching Strategies** - Polynomial Puzzler - Completed on first day of class for review. - Student will work independently and cooperatively on daily assignments from the HMH Fuse App - MDC – Manipulating Radicals - Day 1: - Complete pre-assessment - Group according to pre-assessment data - Day 2: - Complete Manipulating Radicals Activity is assigned groups - Day 3: - Complete post assessment - Asymptote Bingo – play bingo to learn about asymptotes - Exploring Rational Function Lecture – work through the lecture handouts with students - Rational Function Foldable – allow students to complete the foldable to practice identifying elements of rational functions. **Summarizing Strategy** Students will participate in a whole group discussion to compare how they determined the solutions to the card matching game and what methods of problems solving they found to be most helpful. **Homework from HMH Fuse Common Core App** 5-1 PR Exercises: 18, 20, 22, 24, 27, 28, 31, 39 AD Exercises: PR, Challenge and Extend 5-2 PR Exercises: 18, 22, 24, 28, 32, 43 AD Exercises: PR, Challenge and Extend 5-3 PR Exercises: 18, 20, 22, 26, 28, 31, 42 AD Exercises: PR, Challenge and Extend 5-4 PR Exercises: 18, 20, 24, 26, 30, 44 AD Exercises: PR, Challenge and Extend 5-5 PR Exercises: 20, 26, 28, 29, 30, 34, 37 AD Exercises: PR, Challenge and Extend 5-6 PR Exercises: 32, 38, 42, 46, 54, 58, 72 AD Exercises: PR, Challenge and Extend 5-7 PR Exercises: 26, 30, 36, 40, 42, 46, 67 AD Exercises: PR, Challenge and Extend 5-8 PR Exercises: 28, 34, 36, 40, 42, 45, 46 AD Exercises: PR, Challenge and Extend	Rational Function Review Jeopardy Game http://www.epsilon-delta.org/2012/03/polynomial-and-rational-function-review.html **Learning Styles** Visual Auditory Kinesthetic	
4-5	LT 10: I can extend the domain of trigonometric functions using the unit circle. (CCSS. F.TF.A.1,2,3)	**Materials** - MDC – Ferris Wheel http://map.mathshell.org/materials/lessons.php?taskid=427&subpage=concept-MDC – printouts, need to be cut prior to activity	**Essential Questions** How can the unit circle help us evaluate trig functions quickly? How can symmetry and reflections be used to construct the unit circle from memory? **Set** - MDC – Manipulating Radicals - Day 1: - Complete pre-assessment	**Remediation** - Lesson Intervention (from HMH 10.1-10.6) **Enrichment** -Challenges 1-4 (from HMH) OR	**Formative Assessments:** -Homework **Performance Assessments:** MDC – Ferris Wheel http://map.maths

		- Real World Trig Collages and Questions http://secondarymissrudolph.blogspot.com/2013/11/real-world-conic-trig-collages.html **iPad Apps** HMH Fuse App: Algebra 2 Common Core **Equipment** - iPad	- Group according to pre-assessment data - Day 2: - Complete Manipulating Radicals Activity in assigned groups - Day 3: - Complete post assessment - Create Colleges demonstrating where trig functions are seen in the real word - Solve real world example problems on the college activity web site. **Teaching Strategies** - MDC completion - The lesson is to be completed over three days - About a week after the lesson, the post-assessment is given - Student will work independently and cooperatively on daily assignments from the HMH Fuse App - Students will complete the Real World Trig Collage activity **Summarizing Strategy** Students will display their collages in the classroom and complete a gallery walk to view them. Teacher will lead a discussion about where they see trig occurring in the collages and if they are accurate representations or not. Then students will show and discuss their solutions to the real world questions. **Homework from HMH Fuse Common Core App** 10-1PR Exercises: 14, 16, 19, 20, 22, 27 AD Exercises: PR, Challenge and Extend 10-2 Exercises: 26, 30, 36, 42, 50 AD Exercises: PR, Challenge and Extend 10-3 PR Exercises: 20, 24, 28, 32, 35, 36 AD Exercises: PR, Challenge and Extend 10-4 PR Exercises: 8 18, 20, 25, 26, 30, 31 AD Exercises: PR, Challenge and Extend 10-5 PR Exercises: 14, 18, 20, 24, 29, 34 AD Exercises: PR, Challenge and Extend 10-6 PR Exercises: 10, 15, 16, 24, 33 AD Exercises: PR, Challenge and Extend	-Problem Solving 1-4 (from HMH) **Learning Styles** Visual Auditory Kinesthetic	hell.org/materials/lessons.php?taskid=427&subpage=concept- **Summative Assessments:** – Summative Test
6	LT 11: I can model periodic phenomena with trigonometric functions. (CCSS. F.TF.B.5)	**Materials** - Trig Art Project http://www.epsilon-delta.org/2012/10/trig-art-projects-2012.html **Websites:** - Desmos.com – to explore trigonometric transformations **Equipment** - iPad	**Essential Questions** How do you identify transformations of periodic functions? **Set** After students have pre-viewed HMH Fuse lessons 11.1 and 11.2 two, teacher will lead them in an exploratory lesson on desmos to discover how different parts of a function transform and move it. Then the teacher will introduce the project giving parameters and showing examples of previous student work. **Teaching Strategies** - Desmos transformation practice - Teacher will lead students in transforming and analyzing different types of periodic functions to explore the ways they move. - Student will work independently and cooperatively on daily assignments from	**Remediation** - Lesson Intervention (from HMH 11.1-11.2) **Enrichment** -Challenges 1-2 (from HMH) OR -Problem Solving 1-2 (from HMH) **Learning Styles** Visual	**Formative Assessments:** - Homework **Performance Assessments:** Trig Art Project **Summative Assessments:** Trig – Summative Test

		<u>iPad Apps</u> HMH Fuse App: Algebra 2 Common Core	the HMH Fuse App **<u>Summarizing Strategy</u>** Students will show and discuss their graphed periodic functions along with the corresponding tables to the class. The class will vote on the most creative and the willing will win a gift card in the amount of \$9.42 (3π). **<u>Homework from HMH Fuse Common Core App</u>** 11-1Exercises: 18, 20, 28, 30, 31, 40 AD Exercises: PR, Challenge and Extend 11-2 Exercises: 12, 16, 24, 30, 31 AD Exercises: PR, Challenge and Extend	Auditory Kinesthetic	