Unit D - *Using Calculus to Sketch Curves*

Overview

Students will use methods of calculus to determine critical points, points of local and absolute extrema, intervals of increasing and/or decreasing, points of inflection, and intervals of concavity. Together with material already covered (such as x and y intercept(s), vertical and/or horizontal, and/or slant asymptotes, etc) they will draw clear sketches of graphs without using the graphing calculator. In addition, linear approximations and L'Hopital's Rule are covered. Students are given time throughout the unit to work with peers to solve problems.

21ˢᵗ Century Capacities: Analyzing, Collective Intelligence

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS	
MP4 Model with Mathematics **MP5** Use appropriate tools strategically **MP7** Look for and make use of structure CCSS.MATH.CONTENT.HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. CCSS.MATH.CONTENT.HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. CCSS.MATH.CONTENT.HSA.SSE.A.1 Interpret expressions that represent a quantity in terms of its context.*	*Transfer:* *Students will be able to independently use their learning in new situations to...* 1. Manipulate equations/expressions or objects to create order and establish relationships. (Analyzing and Collective Intelligence) 2. Draw conclusions about graphs, shapes, equations, or objects. (Analyzing and Collective Intelligence) *Meaning:* **UNDERSTANDINGS:** *Students will understand that:* 1. Mathematicians argue the relationships between problem scenarios and mathematical representation. 2. Mathematicians examine relationships to discern a pattern, generalizations, or structure. 3. Mathematicians analyze change and make predictions in various contexts. **ESSENTIAL QUESTIONS:** *Students will explore & address these recurring questions:* A. What math tools/models/strategies can I use to solve the problem? B. How can a variable/expression/equation/graph tell a story? C. How can change be described? D. How can I break a problem down into manageable parts?

Acquisition:	
Students will know…	*Students will be skilled at…*
1. When L'Hopital's Rule is appropriate to determine a limit 2. The 1st derivative test 3. The 2nd derivative test 4. Vocabulary: local and absolute maximum, local and absolute minimum, extrema, bounded, critical number, increasing function, decreasing function, point of inflection, concavity	1. Curve sketching 2. Using L'Hopital's Rule to find a derivative 3. Finding linear approximations 4. Determining local and/or absolute extrema 5. Finding a window for a complete graph on graphing calculator 6. Using derivatives and critical numbers to determine the shape of a curve (whether it is increasing or decreasing, turning, etc.) 7. Using the 2nd derivative test to determine points of inflection and concavity 8. Using calculus concepts from this unit to sketch polynomial, rational, exponential, trigonometric and radical functions.