Moon Area School District Curriculum Map
Course: Calculus
Grade Level: 11 and 12
Content Area: Mathematics
Frequency: Full-Year Course

Big Ideas

1. Differentiation
2. Integration

Essential Questions

1. What is a function?
2. What is the importance of the domain of a function?
3. What is a limit?
4. What is the relationship between a limit and a derivative?
5. Where will you use related rate problems?
6. How do you choose the proper technique for finding the derivative?
7. How are the first and second derivative tests important in graphing?
8. Where will you ever use optimization in your future?
9. What is an Integral?
10. How are derivatives and Integrals related?
11. What is the Fundamental Theorem of Calculus?
12. How do you choose the proper integration technique?

Primary Resource(s) & Technology

Calculus of a Single Variable, Larson Hostetler Edwards 8th Edition
ISBN 0-618-50304-8
Microsoft Teams, Promethean Boards, IXL

Pennsylvania and/or focus standards referenced at:

www.pdesas.org
www.education.pa.gov

Big Ideas/EQs	Focus Standard(s)	Assessed Competencies (Key content and skills)	Timeline
What do I recall from Trigonometry and Pre-Calculus? What is a function?	Eligible Content:	• Evaluate trigonometric functions. • Solve trigonometric equations • Graph trigonometric functions.	August - September Days – 1-17

What is the importance of the domain of a function?		• Factor polynomials using various techniques. • Rationalize numerators and denominators in rational expressions. • Apply the difference quotient. • Simplify rational expressions. • State the symmetry of a function. • Sketch a function given its domain and range. • State the intersection between two graphs. • State the slope of a line. • Write the equation of a line. • State the domain and range of a function. • State the composition of a function.	
What is a limit?	Limits Graphically Limits Numerically Evaluate Limits Continuity and One-Sided Limits Infinite Limits	• Find a limit graphically. • Find a limit numerically. • Learn ways a limit can fail to exist. • Evaluate a limit analytically. • Determine continuity at a point and on an interval. • Use the Intermediate Value Theorem. • Evaluate a one-sided limit. • Determine infinite limits. • Find and sketch vertical asymptotes.	Days- 18-38

What is a derivative? What is the relationship between a limit and a derivative? How do differentiability and continuity relate? What are applications for differentiation? Where will you use related rate problems? How do you choose the proper technique for finding the derivative?	Tangent Line Derivative Power Rule Product Rule Quotient Rule Chain Rule Implicit Differentiation Related Rates	• Use the limit definition to find a derivative. • Find the tangent line to a curve at a point. • Describe the relationship between continuity and differentiability. • Find the derivative using the constant rule, power rule and sum and difference rules. • Find the derivatives of the sine and cosine functions. • Use derivatives to find rates of change. • Find a derivative using the quotient and/or product rules. • Find the derivative of a trigonometric function. • Find higher order derivatives. • Find a derivate using the chain rule. • Simplify a derivative using algebra. • Distinguish between functions written implicitly and explicitly. • Use implicit differentiation to find the derivative of a function. • Find and use related rates to solve problems.	Days – 39-90
How are the first and second derivative tests important in graphing? Where will you ever use optimization in your future?	Extrema on an Interval Rolle's Theorem, Mean Value Theorem, First Derivative Test, Second Derivative Test, Limits at Infinity, Curve Sketching,	• State the maximum/minimum of a function. • State the critical values of a function. • Apply Rolle's Theorem. • Apply the Mean Value Theorem.	Days 91-140

	Optimization Problems	• State intervals where a function is increasing or decreasing. • State intervals where a function is concave up or concave down. • State the inflection point(s) of a function. • State the limit as x approaches infinity. • State the horizontal asymptote of a function. • Solve applied minimum and maximum problems.	
What is an Integral? How are derivatives and Integrals related? What is the Fundamental Theorem of Calculus? How do you choose the proper integration technique?	Antiderivatives, Indefinite Integration, Area, Riemann Sums, Definite Integrals, Fundamental Theorem of Calculus, Integration by Substitution, Numerical Integration	• State the antiderivative of a function. • State the solution of a function given certain values. • Calculate the area under a curve for a set interval using the sum of rectangles. • State the definite integral by using the summation formula. • State the value of a definite integral. • State the average value of a function on a given interval. • State the integral of a function by substitution or change of variable. • State the approximate value of an integral by the Trapezoid Rule or Simpson's Rule.	Days 141-175