Calculus Curriculum Map
Created March 2023

Month	Unit/Topic of Study from CPM	Standards	Key Vocabulary	Test Taking and Reading and Engagement Strategies	Math Skills with Depth of Knowledge	Writing in the content area	Assessments
Sept	Chapter 1: A Beginning Look at Calculus **15 Days**	EK 3.2C1*, EK 3.4C1*, EK 2.1A1*, EK 2.3C1* EK 1.2A1*, EK 1.1D1*, EK 2.1C4*, EK 2.1B1*, EK 3.4D2*, EK 2.3D1*, EK 3.4B1, EK 3.3A2*, EK 3.2B1*	Prism Cylinder Sphere Pyramid Cone Graphing Form Point-Slope Form Even Function Odd Function Piecewise Function Continuous Not Continuous Interval Notation Set Notation Step Function End Behavior Slant Asymptote Horizontal Asymptote Approach Statement Indeterminate Form Inverse Functions	The Slope Walk Design a Flag Kagan: Numbered Heads Together	In this chapter students will: • **Explore** the Fundamental Theorem of Calculus informally through interpreting the area under a velocity graph as displacement and the slope of a position graph as velocity. • **Apply** algebra to describe the graphs of various functions. These descriptions will include domain, range, end behavior, discontinuities, and horizontal and vertical asymptotes. Piecewise-defined functions, composite functions, inverse functions, and even and odd functions are also investigated. • **Informally** describe the rates of change of functions. These methods include analyzing finite differences, writing slope statements, and kinesthetically *walking* a graph (comparing	Content Writing Map https://docs.google.com/document/d/1e8TtIvyzuF5GhHaazWVAqFS4DzCNc7eMcXk_ID_JH1s/edit	Individual Quizzes: 1.1 1.2 1.3 1.4 1.5 Team Quiz Chapter 1 Assessment

			Slope Statement Average Velocity Initial Position Final Position Displacement Total Distance Velocity Speed Acceleration		steepness to velocity). ● **Apply** geometry to approximate the area under a curve using dissection, determine if an approximation is greater or less than the actual area, and seek ways to improve these approximations. ● **Rotate** two-dimensional "flags" to generate three-dimensional solids such as cones, spheres, and cylinders, and compute the corresponding volumes. ● **Identify** a hierarchal relationship among position, velocity, and acceleration. Then draw distinctions between velocity and speed; and displacement, total distance, and actual position. ● **Compute** the *average* rate of change given a velocity function or a distance function, and interpret its meaning physically. ● **Given** a position function, determine average velocity on a closed interval. ● **Given** a velocity function, determine average velocity on a closed interval.		

Oct	Chapter 2: Rates, Sums, Limits, Continuity **11 Days** Chapter 3: Slope and Curve Analysis **14 Days**	Chapter 2 ---------- EK 3.2B2, EK 3.2A1, LO 1.1A1, EK 1.1A2, EK 1.1A3, EK 1.1B1, EK 1.2A1, EK 1.2A3, EK 1.2B1, EK 1.1C1, EK 1.1C2, EK 1.1D1, EK 1.1D2, EK 2.1A1, EK 2.1B1, EK 2.3B2, EK 3.2A3 Chapter 3 ---------- EK 2.1B1, EK 2.1C3, EK 2.3B1, EK 2.1A1, EK 2.1A2, EK 2.1A3, EK 2.1C1, EK 2.3C1, EK 2.1A5, EK 2.3A1, EK 2.1D1, EK 2.1D2, EK 2.2B1, EK 2.1A4, EK 2.2B1, EK 2.2B2, EK 3.1A1,	Chapter 2: ---------- Trapezoid Rule Summation Notation Index Argument Riemann Sums Limits Continuous Continuous Over an Interval Intermediate Value Theorem Locally Linear Cusp Linearization Chapter 3: ---------- Slope Function Vertical Stretch Vertical Shift Horizontal Shift Power Rule Average Rate of Change Instantaneous Rate of Change Derivative Increasing Decreasing Extrema Maximum Minimum Monotonic Concave Up Concave Down Point of	Ramp Lab Curve Constructor Lab Kagan: Showdown	In Chapter 2 students will: • **Approximate** the area under a curve using trapezoids and left, right, and mid segment rectangles, with or without uniform partitions. • **Apply** summation notation to express a Riemann sum where all rectangles have uniform partitions. • **Apply** limits, including one-sided limits and limits to infinity, to describe the asymptotic or unbounded behavior of a function. • **Apply** limits to compare the relative magnitudes of functions. • **Discuss** the local linearity of well-behaved functions. • **Examine** various ways that a limit might *not* exist. • **Prove** the existence of indeterminate limits: • **Apply** a three-part definition of continuity to determine if a function is continuous at a point. • **Examine** how continuity provides the basis for the Intermediate Value Theorem. • **Apply** the difference quotient to approximate the velocity of an object	Claim Identification	Chapter 2: Individual Quizzes - 2.1 2.2 2.3 2.4 Team Quiz Chapter 2 Assessment Chapter 3 Individual Assessments: 3.1 3.2 3.3 3.4 Chapter 3 Team Quiz Chapter 3 Assessment

		EK 3.1A2, EK 2.3B1	Inflection Antiderivative Differentiable Twice Differentiable Symmetric Difference Quotient		at an instant. In Chapter 3, Students will: In this chapter students will: ● **Examine** different interpretations of the derivative: slope of a tangent line, instantaneous rate of change, and the limit of a difference quotient. ● **Define** four different forms of the derivative at a point ● **Extend** definitions of the derivative at a point to the derivative of a function, f'(s) ● **Discover** the Power Rule. ● **Apply** the definition of derivative as a limit to evaluate derivatives of sine and cosine ● **Explore** how first derivatives can be used to indicate where a curve is increasing or decreasing and concave up or concave down, and how second derivatives can be used to indicate where a curve is concave up or concave down. ● **Identify** the relationship		

					between derivatives and other rates of change such as velocity and acceleration. • **Investigate** and categorize functions that are not differentiable everywhere. • **Explore** ways to use differentiation rules to antidifferentiate.		
Nov	Chapter 4: The Fundamental Theorem of Calculus **16 Days**	EK 3.2A3, EK 3.2A2, EK 3.2C2, EK 3.2C1, EK 3.3A1, EK 3.3B3, EK 3.3B1, EK 3.3B2, EK 3.3A2, EK 3.4A1, EK 3.4A2, EK 3.5A4, EK 3.4E1, EK 2.1A1, EK 2.3C3, EK 2.3C1, EK 1.2A1, EK 1.2A2, EK 2.2B2, EK 3.3B2, EK 3.4C1, EK 3.5A1, EK 3.4D1, EK 2.3B1	Definite Integral Lower Bound Upper Bound Integrand Antiderivative Indefinite Integral Area Between and Under Curves Newton's Method	Fast Times Lab Kagan: Numbered Heads Together	In this chapter students will: • **Explore** the definition of a definite integral as the limit of a Riemann sum. • **Apply** algebraic properties to definite integrals, and simplify expressions. • **Interpret** and use definite integrals as a way to calculate area under a curve accurately. • **Interpret** and use definite integrals as a way to calculate accumulation or net change. • **Compare and contrast** definite integrals that yield finite values, definite integrals that yield functions and indefinite integrals	Command of Evidence	Chapter 4 Individual Quizzes: 4.1 4.2 4.3 4.4 4.5 Chapter 4 Team Quiz Chapter 4 Assessment

					• **Understand** the constant of integration. • **Discover** and **apply** both parts of the Fundamental Theorem of Calculus. • **Solve** application problems involving definite integrals and motion: displacement, velocity and acceleration. • **Apply** definite integrals to calculate the area of a region contained between curves.		
Dec	Chapter 5: Derivative Tools and Applications **15 Days**	EK 2.2A1, EK 2.3A1, EK 2.3C1, EK 2.3C3, EK 2.2A1, EK 2.2A2, EK 2.2B1, EK 1.2B1, EK 2.1C3, EK 2.1C1, EK 2.1C4, EK 2.1C2, EK 3.3A2, EK 1.1C3, EK 2.3B2	Critical Point First Derivative Test Second Derivative Test Local Extrema Global Maximum Global Minimum Maxima Minima Extreme Value Theorem Product Rule Chain Rule Quotient Rule Indeterminate Forms L'Hospital's Rule	Optimization Kagan: Quiz-Quiz-Trade Kagan: Rally Table	In this chapter students will: • **Apply** the First and Second Derivative Tests to locate local extrema. • **Apply** the First and Second Derivative Tests, combined with testing endpoints, to locate global extrema. • **Make sense of** the Extreme Value Theorem. • **Develop** derivative rules: Product Rule, Quotient Rule, and Chain Rule. • **Complete a formal proof** of the Product Rule. • **Apply** the Quotient Rule to differentiate sec(x),	Inference	Chapter 5 Individual Quizzes: 5.1 5.2 5.3 5.4 5.5 Chapter 5 Team Quiz Chapter 5 Assessment

					csc(x), tan(x), and cot(x). Recognize and solve optimization problems. • **Apply** the Chain Rule to the Fundamental Theorem of Calculus, when the definite integral has functions as bounds. • **Apply** l'Hôpital's Rule to limits of indeterminate forms.		
Jan	Chapter 6: More Tools and Theorems **13 Days**	EK 2.1C1, EK 2.1C2, EK 2.1C3, K 2.1C4, EK 3.1A2, EK 2.1C5, EK 2.1C6, EK 2.1C2, EK 2.1A1, EK 3.4B1, EK 2.4A1, EK 1.2B1, EK 3.2D1, EK 3.2D2	e Natural logarithm Exponential functions Mean Value Theorem Mean Value Rolle's Theorem Converge Diverge Improper Integrals	The Great Race Kagan: Numbered Heads Together	In this chapter students will: • **Compare** the graphs of exponential and logarithmic functions. • **Apply** implicit differentiation to differentiate functions and relations. • **Apply** implicit differentiation to differentiate logarithmic functions and inverse trigonometric functions. • **Apply** the derivative of a function, at various values of (a,b) to differentiate its inverse, at its corresponding values of (b,a). • **Calculate** and **compare** the average (mean) value and average rate of	Inference	Chapter 6 Individual Assessments: 6.1 6.2 6.3 6.4 6.5 Chapter 6 Team Quiz Chapter 6 Assessment

					change of a function on a closed interval. • **Interpret** and **apply** the Mean Value Theorem, and determine the conditions for which the Mean Value Theorem does not apply. • **Interpret** and **apply** Rolle's Theorem, and determine the conditions for which Rolle's Theorem does not apply. • **Apply** limits to evaluate improper integrals. • **Examine** the convergence or divergence of improper integrals		
Feb	Chapter 7: Related Rates and Integration Tools **16 Days**	EK 2.3D1, EK 2.3A1, EK 2.3C2, EK 3.3B5, EK 3.5A1, EK 3.5A2, K 3.5A3, EK 2.3E1, EK 2.3E2, EK 3.5B1, EK 3.5A4, EK 2.3F1, EK 2.3F2, EK 3.3B5	Related Rates U-substitution Differential Equation Differentials Separation of Variables Slope Fields Euler's Method Integration by Parts Partial Fractions	Cooling Lab Kagan: Numbered Heads Together Kagan: Showdown	In this chapter students will: • **Describe** the rates that dimensions are changing for a given geometric figure whose dimensions are either increasing or decreasing in a non-proportional way. • **Apply** implicit differentiation to set up and solve application problems involving related rates. • **Apply** substitution to	Compare/ Contrast	Chapter 7 Individual Quizzes: 7.1 7.2 7.3 7.4 Chapter 7 Team Quiz Chapter 7 Assessment

					evaluate definite and indefinite integrals, and identify integrands in which substitution can and cannot be used. ● **Learn** implicit integration to solve separable differential equations. ● **Interpret** the statement, "the rate of change of a quantity is proportional to the size of the quantity" as a differential equation whose solution represents exponential growth or decay. ● **Apply** slope fields to sketch general and particular solutions to differential equations..		
March	Chapter 8: Volume **12 Days**	EK 3.4D2, EK 3.4D3	Cylindrical Disk Washer Prism Cross-Section Arc Length	Lime Lab, Shell Lab Kagan: Rally Table Kagan: Numbered Heads Together Kagan: Showdown	In this chapter students will: ● **Develop a method** to set up and evaluate definite integrals that represent the volumes of three-dimensional solids that are generated by rotating two-dimensional regions about horizontal or vertical axes. ● **Distinguish** between disk method and the washer method to calculate volume by rotation, and	Review all 4 1 of each	Chapter 8 Individual Quizzes: 8.1 8.2 8.3 8.4 Chapter 8 Team Quiz Chapter 8 Assessment

					choose the appropriate strategy in context. ● **Develop** a method to set up and evaluate definite integrals that represent the volumes of three-dimensional solids that are generated by accumulating rectangular layers about vertical or horizontal axes. ● **Develop** a method to set up and evaluate definite integrals that represent the volumes of three-dimensional solids that are generated by accumulating two-dimensional cross-sections with a given geometric shape across a region on an xy-plane. ● Given a description of a three-dimensional solid, **choose an efficient method** to calculate the volume, and justify the choice: the disk method, the washer method, the shell method or the cross-section method. ● **Develop a method** to set up and evaluate definite integrals that represent the lengths of curves on an xy-plane.		

April	AP Test Review						
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June							