



Grade Level: 12

Content: Calculus BC

Year: 2022-23

Course Description/Rationale

AP Calculus BC is roughly equivalent to both first and second semester college calculus courses; it extends the content learned in AB to different types of equations and introduces the topic of sequences and series. Students will receive a weighted grade and have the opportunity to take the AP test in the spring. **Recommended student supplies : Graphing Calculator (2 HS credits)**

Name of Unit	Time Frame	Essential Learning Target	Standard(s)
Calculus AB Review of limits	1 week	<ol style="list-style-type: none"> 1. Finding limits graphically, numerically, and analytically 2. Finding limits to determine continuity 3. Be able to find limits of polynomials 4. Be able to find limits of rational functions 5. Be able to find one sided limits 6. Be able to find infinite limits 7. Be able to use the squeeze theorem and IVT 8. Be able to find limits of trig functions 9. Be able to find limits of composite functions 10. Be able to use limits to find vertical and horizontal asymptotes 	
Calculus AB Review of Derivatives and Uses	4 weeks	<ol style="list-style-type: none"> 1. Finding derivatives using the definition 2. Finding derivatives using the power rule, product rule, quotient rule, and chain rule 3. Finding derivatives using implicit differentiation 4. Finding derivatives of trig functions 5. Know the properties of derivatives (constant multiple property, sum and difference property, etc.) 6. Solving related rates problems 7. Solving motion problems 8. Finding derivatives of logs, exponentials, and 	

		<p>inverse trig functions</p> <ol style="list-style-type: none"> 9. Know and interpret what a limits is (slope of a tangent line, instantaneous rate of change, etc.) 10. Know where a function is differentiable 11. L'hopitals Rule to find limits 12. Finding absolute mins/maxes of a function over an interval 13. Find where a function increases and decreases 14. Find where a function is concave up/down 15. Find where a function has local/relative mins/maxes 16. Be able to use the MVT and EVT 17. Be able to use the first and second derivative tests to determine if a critical point is a min or max 18. Be able to find a function's points of inflection 19. Be able to solve optimization problems 	
<p>Calculus AB Review of Integration</p>	<p>8 weeks</p>	<ol style="list-style-type: none"> 1. Be able to find antiderivatives using the power rule and u-substitution 2. Know the basic integration rules (constant multiplication, sum and difference, etc.) 3. Be able to estimate area under curves using Riemann Sums 4. Be able to evaluate definite integrals using the Fundamental Theorem of Calculus 5. Be able to find the area between two curves 6. Be able to find the volume of a figure using the disc/washer method 7. Be able to find the average value of a function over an interval 8. Be able to integrate functions that result in natural logs, inverse trig functions, trig functions, etc. 9. I can use integration to find the length of a curve 10. Be able to use partial fractions to integrate 11. Be able to integrate by parts 12. Be able to use basic integration in finding integrals of things such as disguised forms of the log and power rule 13. Integration by parts 14. Integration using partial fractions 15. Improper integrals 16. Identifying and performing different integration methods like substitution, multiplying by a 	

		<p>conjugate, splitting fractions, completing the square, division of polynomials, etc.</p> <p>17.</p>	
<p>Calculus BC Differential Equations</p>	<p>2-3 weeks</p>	<ol style="list-style-type: none"> 1. Be able to draw slope fields 2. Be able to solve basic differential equations 3. Be able to solve differential equations using separation of variables 4. Be able to solve growth and decay functions using differential equations 5. Be able to verify solutions to differential equations 6. Be able to find a particular solution to a differential equation 7. Be able to use Euler's Method to estimate solutions to differential equations 8. Be able to solve logistic problems 	
<p>Calculus BC Series and Sequence</p>	<p>7 weeks</p>	<ol style="list-style-type: none"> 1. Be able to find limits of sequences 2. Be able to work with harmonic and p-series 3. Be able to work with geometric series 4. Be able to use the different tests to decide whether a series converges or diverges (Divergence Test, Integral Test, Ratio Test, Root Test, Comparison Test, etc.) 5. Be able to determine absolute or conditional convergence 6. Be able to find Taylor polynomials 7. Be able to find Lagrange Error Bound 8. Be able to find the radius and interval of convergence for a power series 9. Be able to find Taylor or McClaurin series for a function 10. Be able to represent a function as a power series 	
<p>Calculus BC Polars, Parametrics, and Vectors</p>	<p>5 weeks</p>	<ol style="list-style-type: none"> 1. Be able to differentiate parametric equations 2. Be able to find arc lengths of curves given by parametric equations 3. Be able to differentiate vector-valued functions 4. Be able to solve motion problems involving parametric and vector-valued functions 5. Be able to differentiate in polar form 6. Be able to find the area of a polar region 7. Be able to find the area bounded by a single polar 	

		curve 8. Be able to find the area of a region bounded by two polar curves	