Integral Applications

Instructional Focus	4 – Mastery	3 – Proficient	2 - Basic	1 – Below Basic	0 – No Evidence
Use and interpret the definite integral to solve problems in various contexts (CHA-4.A, FUN-5.A, CHA-4.B, CHA-4.D, CHA-4.E)	Can Extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	Do **ALL** of the following: • Average value of a function over a given interval • Accumulation of a rate of change • Net change over a given interval **Within various contexts** **Follows math practices of algebraic computation, precision and reasoning***	Do **ALL** of the following: • Average value of a function over a given interval • Accumulation of a rate of change • Net change over a given interval	Do **TWO** of the following: • Average value of a function over a given interval • Accumulation of a rate of change • Net change over a given interval	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1
Apply definite integrals to problems involving motion (CHA-4.B, CHA-4.C, CHA-4.D, CHA-4.E)		Do **ALL** of the following: • Displacement • Total distance traveled • Initial value • Average value **Follows math practices of algebraic computation, precision and reasoning***	Do **THREE** of the following: • Displacement • Total distance traveled • Initial value • Average value	Do **TWO** of the following: • Displacement • Total distance traveled • Initial value • Average value	
Apply definite integrals to problems involving area and volume (and arc length) (CHA-5.A, CHA-5.B, CHA-5.C, CHA-6.A)		Do **ALL** of the following: • Area of a region • Volume by revolution • Volume by cross section • Perimeter of an object defined by curves **Follows math practices of algebraic computation, precision and reasoning***	Do **THREE** of the following: • Area of a region • Volume by revolution • Volume by cross section • Perimeter of an object defined by curves	Do **TWO** of the following: • Area of a region • Volume by revolution • Volume by cross section • Perimeter of an object defined by curves	
Analyze differential equations and obtain general and specific solutions (including logistic growth) (FUN-7.A, FUN-7.B, FUN-7.C, FUN-7.D, FUN-7.E, FUN-7.F, FUN-7.G FUN-7.H)		Sketch a slope field for a given differential equation and **Find a particular solution** of a differential equation Find the carrying capacity of a logistic differential equation when the diff. eq. is not given in standard form and determine when the rate of change is the greatest. **Follows math practices of algebraic computation, precision and reasoning***	Sketch a slope field for a given differential equation and **Find a general solution** of a differential equation Find the carrying capacity of a logistic differential equation when the diff. eq. is not given in standard form.	Sketch a slope field for a given differential equation and **Separate variables** of a differential equation Find the carrying capacity of a logistic differential equation.	
Estimate solutions to differential equations using Euler's Method (FUN-7.C)		Estimate for y-values using Euler's method using appropriate steps. **Follows math practices of algebraic computation, precision and reasoning***	Estimate for y-values using Euler's method.	Create a table to find estimates using Euler's method.	
Use advanced techniques to take the antiderivative of a function. (FUN-6.E, FUN-6.F)		Integrates using **all** of the following techniques: • Integration by parts • Trigonometric Integrals • Trig Substitution* • Partial Fractions **Follows math practices of algebraic computation, precision and reasoning***	Integrates using **two** of the following techniques: • Integration by parts • Trigonometric Integrals • Trig Substitution* • Partial Fractions	Integrates using **one** of the following techniques: • Integration by parts • Trigonometric Integrals • Trig Substitution* • Partial Fractions	

*Math Practices for AP Calculus include:

- Algebraic processes and computations completed logically and correctly
- Attend to precision graphically, numerically and analytically
- Clearly present reasoning and justification with accurate and precise language