AP Calculus – Integral Applications

Instructional Focus 5.1: The definite integral of a function over an interval is a mathematical tool with many interpretations and application involving accumulation.

CCSS & Example	4 – Mastery	3 – Proficient	2 - Basic	1 – Below Basic	0 – No Evidence
Use and interpret the definite integral to solve problems in various contexts. (LO 3.4A, LO 3.4B, LO 3.4E)	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**	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. (LO 3.4C, LO 3.4B)		Do **ALL** of the following: • Displacement • Total distance traveled • Initial value • Average value	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. (LO 3.4D)		Do **ALL** of the following: • Area of a region • Volume by revolution • Volume by cross section	Do **TWO** of the following: • Area of a region • Volume by revolution • Volume by cross section	Do **ONE** of the following: • Area of a region • Volume by revolution • Volume by cross section	

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Instructional Focus 5.2: Antidifferentiation is an underlying concept involved in solving separable differential equations. Solving separable differential equations involves determining a function or relation given its rate of change.

CCSS & Example	4 – Mastery	3 – Proficient	2 - Basic	1 – Below Basic	0 – No Evidence
Analyze differential equations to obtain general and specific solutions. (LO 3.5A, LO 2.3E) Interpret, create, and solve differential equations from problems in context. (LO 3.5B) Estimate solutions to differential equations. (LO 2.3F)	Can Extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	Sketch a slope field for a given differential equation and **Find a particular solution** of a differential equation	Sketch a slope field for a given differential equation and **Find a general solution** of a differential equation	Sketch a slope field for a given differential equation and **Separate variables** of a differential equation	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1
Interpret, create, and solve, differential equations from problems in context (including logistic growth) (EK 3.5B2)		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.	Find the carrying capacity of a logistic differential equation when the diff. eq. is not given in standard form.	Find the carrying capacity of a logistic differential equation.	