

Derivative Applications

Instructional Focus	4 – Mastery	3 – Proficient	2 - Basic	1 – Below Basic	0 – No Evidence
Solve problems involving rectilinear motion and planar motion (CHA-3.A, CHA-3.B)	<p>Can Extend thinking beyond the standard, including tasks that may involve one of the following:</p> <ul style="list-style-type: none"> • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving 	<p>Apply the derivative to solve rectilinear motion problems involving all of the following:</p> <ul style="list-style-type: none"> • Velocity • Acceleration • Direction • Change in direction • Speeding up / Slowing down • Average velocity/acceleration <p>Indicating appropriate units</p> <p>Follows math practices of algebraic computation, precision and reasoning*</p>	<p>Apply the derivative to solve rectilinear motion problems involving four of the following:</p> <ul style="list-style-type: none"> • Velocity • Acceleration • Direction • Change in direction • Speeding up / Slowing down • Average velocity/acceleration <p>Indicating appropriate units</p>	<p>Apply the derivative to solve rectilinear motion problems involving three of the following:</p> <ul style="list-style-type: none"> • Velocity • Acceleration • Direction • Change in direction • Speeding up / Slowing down • Average velocity/acceleration 	<p>Little evidence of reasoning or application to solve the problem</p> <p>Does not meet the criteria in a level 1</p>
Solve problems involving related rates (CHA-3.A, CHA-3.C, CHA-3.D, CHA-3.E, FUN-4.D, FUN-4.E)		<p>Apply the derivative to solve related rates problems in context.</p> <p>Follows math practices of algebraic computation, precision and reasoning*</p>	<p>In related rate problems, compute the derivative with respect to time correctly.</p>	<p>In related rate problems, label the given values, function(s), and the unknown quantities.</p>	
Solve problems involving optimization (CHA-3.A, CHA-3.C, FUN-4.B, FUN-4.C, FUN-4.D, FUN-4.E)		<p>Apply the derivative to solve optimization problems in context.</p> <p>Follows math practices of algebraic computation, precision and reasoning*</p>	<p>In optimization problems, rewrite primary equation in terms of one independent variable and correctly differentiate.</p>	<p>In optimization problems, label the given values, function(s), and the unknown quantities.</p>	
Use derivatives to analyze properties of a function. (FUN-1.C, FUN-4.A, FUN-4.B, FUN-4.D, FUN-4.E)		<p>Using correct justification, explain the key features of a function to determine all of the following:</p> <ul style="list-style-type: none"> • Intervals of increase or decrease. • Local and global extrema. • Intervals of concavity • Points of inflection <p>Follows math practices of algebraic computation, precision and reasoning*</p>	<p>Using correct justification, explain the key features of a function to determine three of the following:</p> <ul style="list-style-type: none"> • Intervals of increase or decrease. • Local and global extrema. • Intervals of concavity • Points of inflection 	<p>Using correct justification, explain the key features of a function to determine two of the following:</p> <ul style="list-style-type: none"> • Intervals of increase or decrease. • Local and global extrema. • Intervals of concavity • Points of inflection 	
Analyze various representations of functions using derivatives. (FUN-1.C, FUN-4.A, FUN-4.B)		<p>Explain key features of f, given f' and f'', in all of the following forms</p> <ul style="list-style-type: none"> • Numerically • Graphically • Analytically <p>Follows math practices of algebraic computation, precision and reasoning*</p>	<p>Explain key features of f, given f' and f'', in two of the following forms</p> <ul style="list-style-type: none"> • Numerically • Graphically • Analytically 	<p>Explain key features of f, given f' and f'', in one of the following forms</p> <ul style="list-style-type: none"> • Numerically • Graphically • Analytically 	

*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