

CALCULUS 12 LG 12/13

APPLICATIONS OF THE DERIVATIVE



INTRODUCTION:

In this learning guide we will study various applications of the derivative. For example, we will investigate problems concerned with finding the “best” way to perform a task. In addition, we will use the derivative to study the motion of a particle along a line.



LEARNING GUIDE EXPECTATIONS:

On the completion of this learning guide you will be able to:

- 1) Determine absolute extrema of functions on open and closed intervals.
- 2) Solve optimization problems.
- 3) Solve problems involving distance, velocity, and acceleration.
- 4) Use Newton’s formula (with technology) to find the solution of given equations, $f(x) = 0$.
- 5) Understand and apply the Mean Value Theorem.



EVALUATION:

When you are ready, write the LG 12/13 quiz.



RESOURCES NEEDED:



Calculus 12 text.



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LEARNING ACTIVITIES



Expectation #1: Determine absolute extrema of functions on open and closed intervals.



1. [Watch and take notes on instructional video on Absolute Extrema.](#)



2. In Chapter 6.1, read pages 330-top of page 336 (ignore the part on “Absolute Extrema and Parametric Curves”).



3. In your journal,
 - I. Explain in your own words the Extreme Value Theorem.
 - II. Explain how to find the absolute extrema on a closed interval.



4. On pages 337-338, complete questions #3, 5-33, 37.



Expectation #2: Solve optimization problems.



1. [Watch and take notes on instructional video on Applied Max-Min Problems.](#)



2. In Chapter 6.2, read pages 339-347.



3. In your journal, include the 5 step procedure that can be used to solve applied max and min problems. Use your own words so it makes sense to you.



4. On pages 348-349, complete questions #1, 3-6, 9, 11, 15, 17, 19, 23, 25, 33, 41, 45, 51.



Expectation #3: Solve problems involving distance, velocity and acceleration.



1. [Watch and take notes on instructional video on Distance, Velocity and Acceleration.](#)



2. In Chapter 6.3, read pages 352-359.



3. In your journal,
 - I. Explain how you can find a velocity and acceleration function from a distance function.
 - II. Explain how you can determine when a particle is speeding up or slowing down.



4. On pages 359-361, complete questions #1-3, 5, 11-23, 25, 27.



Expectation #4: Use Newton's formula (with technology) to find solutions of given equations,
 $f(x) = 0$.



1. [Watch and take notes on instructional video on Newton's Method.](#)



2. In Chapter 6.4, read pages 363-366.



3. In your journal, describe using an example, how to approximate the zeros of a function using Newton's Method.



4. On pages 366-367, complete questions #1-23, 27.



Expectation #5: Understand and Apply the Mean Value Theorem



1. [Watch and take notes on instructional video on the Mean Value Theorem.](#)



2. In Chapter 6.5, read the part about the Mean Value Theorem on pages 369-371.



3. In your journal, make a note about the mean value theorem. Make sure to emphasize this only applies to differentiable and continuous functions.



4. On pages 372-373, complete questions #11-16.

Once you feel you are ready for the LG 12-13 quiz, complete the LG 12-13 Assessment Quiz on the website under "Assessment Quizzes" and then email your marked LG 12-13 quiz to your teacher along with any questions you may have. Please email your quiz as a pdf combined into 1 file and attach it to an email. You may email either version A or version B of the LG assessment quizzes.