Unit #2: Basic Differentiation

Content Area: **Mathematics**
Course(s): **Calculus A**
Time Period: **Semester 1**
Length: **4 weeks**
Status: **Published**

Standards

MA.F-IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MA.S-ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
MA.F-TF.A.3	Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosines, and tangent for π – x, π + x, and 2π – x in terms of their values for x, where x is any real number.

Enduring Understandings

The tangent line problem leads to the formal definition of a derivative.

The derivative tells us the instantaneous rate of change for a function. The instantaneous rate of change of a function is the slope of the tangent line.

There are different methods of differentiation that should be applied based on the type of expression.

The derivative of a function can be used as a problem solving tool.

Essential Questions

How do you find the slope of a curve at an instantaneous point?

How can you find the derivative of a function using the limit process?

What rules allow you to find the derivative of a function without using the entire limit process?

At what types of points can we not find the derivative of a function?

How can you find the derivative of a function implicitly?

How do derivatives relate to problems in physics?

What is the relationship between differentiability and continuity?

What do the derivatives of a function tell us about that function?

How does the concept of a limit lead to a derivative?

Knowledge and Skills

- Find the slope of the tangent line to a curve at a point.
- Use the limit definition to find the derivative of a function.
- Understand the relationship between differentiability and continuity.
- Find the derivative of a function using the constant rule.
- Find the derivative of a function using the power rule.
- Find the derivative of a function using the constant multiple rule.
- Find the derivative of a function using the sum/difference rule.
- Take derivatives involving sine and cosine.
- Find the instantaneous velocity of a falling object.
- Use the product rule for finding derivatives.
- Use the quotient rule for finding derivatives.
- Differentiate all trigonometric functions.
- Take higher order derivatives.
- Relate higher order derivatives with physics applications.
- Differentiate using the chain rule.
- Identify implicit and explicit function.
- Differentiate implicit functions.
- Use implicit differentiation to find the slope of a tangent line to a curve.
- Find a related rate.
- Use related rates to solve real life problems.

Transfer Goals

Recognize and solve practical or theoretical problems involving mathematics, including those for which the solution approach is not obvious, by using mathematical reasoning and strategic thinking.

Understanding the heiracrchy within some fields helps to predict components.

Resources

Calculus of a Single Variable (6th Edition)

Authors: Edwards, Hostetler, Larson

Sections: 2.1 - 2.6

Graphing Calculator

www.desmos.com

https://www.edx.org/school/davidson-next

http://www.larsoncalculus.com/calc10/content/interactive-examples/