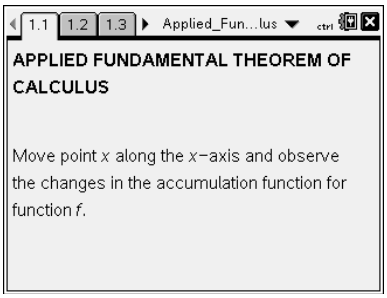
Applied Fundamental Theorem of Calculus
Student Activity

Name _____
Class _____

Open the TI-Nspire document
***Applied_Fundamental_Theorem_of_Calculus.tns*.**



The accumulation function, $A(x)$, measures the definite integral of a function f from a fixed point a to a variable point x. In this activity, you will explore the relationship between a function, its accumulation function, and the derivative of the accumulation function. These observations will help you better understand the consequences of the Fundamental Theorem of Calculus for computing definite integrals.

Move to page 1.3.

Press ctrl ▶ and ctrl ◀ to navigate through the lesson.

The top graph shown represents the velocity of a car on a 15-hour drive. The x-axis represents the time in hours, and the y-axis represents the velocity of the car in miles per hour. The accumulation function, $A(t)$, gives the value of the definite integral of $f(t)$ between a and x. In this graph, the value of a is set to 2 hours.

1. Move point x along the axis to find each of the following values.
   a. What is the velocity of the car at 6 hours?

   b. When is the car going 50 miles per hour?

   c. $A(5) = \int_2^5 f(x)\,dx$ = _____

   d. $A(14) = \int_2^{14} f(x)\,dx$ = _____

2. The bottom graph shows the accumulation function as a function of x, with $a = 2$. What appears to be the relationship between the two graphs? Explain.

Move to page 2.2.

The top graph is the graph of the accumulation function, $y = A(x)$, for the function f from the previous pages, and the bottom graph shows the graph of its derivative, $y = A'(x)$.
Move point x back and forth along the graph.

3. What do you notice about the relationship between the two graphs?

Move to page 3.1.

4. The velocity function graphed is $F'(x) = -x^2 + 15x$. How could you find the equation for $F(x)$ using the information from the graph?

5. The accumulation function is the antiderivative of the velocity function. What does an accumulation of 477 represent in terms of the problem?

6. How many miles did the driver travel between 2 and 6 hours from the start of the road trip?