**Unit 3: Investigation 3 (2 Days)**

**FUNCTION NOTATION AND EVALUATING FUNCTIONS**

**CCSS: F-IF 2**

**Overview**

Students will be introduced to function notation, will learn to evaluate functions written in function notation, and will explore piecewise functions to solve real world problems.

**Assessment Activities**

**Evidence of Success: What Will Students Be Able to Do?**

Use function notation to solve problems and evaluate functions using function notation.

**Assessment Tools: How Will Students Show What They Know?**

* **Exit Slip 3.3.1** and **Exit Slip 3.3.2** ask students to represent a function using function notation and use function notation to explore the situation.
* **Journal Entry** asks students to describe the meaning of *f*(*x*).

**Launch Notes**

Begin class by reminding students that there are several ways of representing a function: equation, table, mapping diagram, graph, and verbal description. Function machines and function notation are additional ways in which functions can be represented.

**Closure Notes**

The investigation culminates with students successfully demonstrating their ability to use function notation. This may be done with **Exit Slip 3.3a** or **Exit Slip 3.3b**. You may ask students to discuss what they think are the benefits to using function notation.

**Teaching Strategies**

1. **Activity 3.3.1 Function Machines** introduces function notation through the concept of a function machine and enables students to evaluate linear and non-linear functions. An alternate, or complementary, approach is to introduce function notation through the exploration of a contextual problem (See **Activity 3.3.2 Introduction to Function Notation)**. In this activity, students examine the salary of a travel agent whose salary is a function of the number of cruises that she books. Both activities address the misconception that *f*(*x*) means multiply *f* and *x* and both activities ask students to identify the domain and range of functions.

**Differentiated Instruction (For Learners Needing More Help)**

**Activity 3.3.2 Introduction to Function Notation** allows students to explore a linear function that is similar to linear equations explored in Unit 2. Some students may need to see a table of values (asked for in question 6) before considering the recursive and explicit rules in questions 2 and 3.

1. Currency conversion is another context in which functional notation may be used to represent a function. **Activity 3.3.3 Exchange Rates** begins by prompting students to go online to find the current exchange rate of U.S. dollars to Euros. Using this information, students create a function that converts U.S. dollars to Euros, and then use the function to solve problems. The lesson concludes by prompting students to create a function that converts Euros to U.S. dollars.
2. **Activity 3.3.4 Hot Air Balloon** enables students to explore a piecewise function that models a real world situation. Students can complete this activity individually or in pairs. Given a graph of a piecewise function, students will identify the domain and range, evaluate the function for given inputs, and identify inputs which correspond to given outputs.

**Group Work**

Ask students to pair with a neighboring student to complete the **Activity 3.3.4 Hot Air Balloon** activity.

**Differentiated Instruction (Enrichment)**

Students explore piecewise functions in contextual and non-contextual situations. **Activity 3.3.5 Piecewise Functions** enables students to evaluate and graph piecewise functions and use piecewise functions to solve contextual problems.

**Journal Entry**

1. What does *f*(*x*) represent? Describe this notation using your own words.
2. Describe a good way to remember how to write an equation in function notation.

Have student complete **Exit Slip 3.3a** or **Exit Slip 3.3b**, which require students to evaluate and explore a function given in function notation. **Exit Slip 3.3b** provides a more challenging function.

**Resources and Materials**

* **Activities 3.3.1 –** Function Machines
* **Activities 3.3.2 –** Intro to Function Notation
* **Activities 3.3.3 –** Exchange Rates
* **Activities 3.3.4 –** Hot Air Balloons
* **Activities 3.3.5 –** Piecewise Functions
* **Exit Slip 3.3a –** Functions
* **Exit Slip 3.3b –** Functions
* Bulletin board for key concepts
* Student journals