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| **Overview** | |  | **Concepts** | | | |
| Students will investigate a pattern using the constant function on the calculator, record the ordered pairs in a table, describe the pattern, and predict what will come next.  **Grade Levels: 3–5** | |  |  | * Whole numbers * Addition * Comparing numbers * Multiplication * Estimation * Functions | | |
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| **Materials** | | | | | | |
| * C:\Users\Karen\AppData\Local\Temp\Temp1_Texas Instruments - Icon rendering.zip\Texas Instruments - Icon rendering\JPEG\Calculator icon.jpg TI-10, TI-15 Explorer™ calculators * Student activity sheet * Pencils | | | | | | |
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| **Assessment** | | | | | | |
| Throughout the activity, questions are included for formative assessment. Student work should be used as a check for understanding. Have the students use the TI-10 or the TI-15 Explorer™ calculator to complete the activity. | | | | | | |

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| **Introduction** |
| * + 1. To play the following game, students need to set the calculator to hide the constant. Press  .     2. Have students work in pairs to play the following game. The first partner will secretly write and then enter a constant function and a starting number on the calculator. Then he or she will press  once more and hand the calculator to the second partner.   **Example:**  The first partner might choose to subtract by two, starting at 100. This student would enter .   * + 1. The second partner will record the displayed value in the table on the activity sheet after each press of the key. He or she will press repeatedly.   **Example:**   |  |  | | --- | --- | | **Number of times has been pressed** (left side of the display) | **Result**  (right side of the display) | | **1** | **98** | | **2** | **96** | | **3** | **94** | | **4** | **92** | | **5** | **90** | | **6** | **88** | | **7** | **86** | | **8** | **84** | | **9** | **82** | | **10** | **80** |  * + 1. Have each pair of students study the pattern in their table and describe it on the activity sheet. Have the student who built the table guess the mystery constant function and predict what will come next in the pattern. Have both partners in each pair predict the number that would be displayed on the 95th press of and write it on the activity sheet.  1. To see the constant that was entered in , press   . . 2. Have partners switch roles and continue the same investigation with a different mystery constant function. Press to clear the constant stored in   . Hide the constant by pressing . |
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| |  |  |  | | --- | --- | --- | | |  |  | | --- | --- | | |  | | --- | | **Using the Calculator**  •  *What is your constant operation? What is your starting number* | | | |
| **Collecting and Organizing Data** |
| While students explore their patterns, ask questions such as: |
| **Questions for Students:**   * *Are the numbers in your table getting larger or smaller? By how much?* * *What do the numbers in your table represent?* * *What patterns do you notice in your table?* * *What would happen if the mystery constant function remained the same but the starting number changed? How would the numbers in your table change?* * *What would happen if you entered a constant function with a negative number? With a fraction? With a decimal?* |
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| |  |  |  | | --- | --- | --- | | |  |  | | --- | --- | | |  | | --- | | **Using the Calculator**  •  *How could you describe what the calculator does each time you press ? What should come next in your table if you are correct?*  •  *How can you use the calculator to predict the 95th number in your table?*  •  *What happens if your numbers get too big?* | | | |

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| **Analyzing Data and Drawing Conclusions** |
| After pairs of students have investigated several mystery constant functions, have students work as a whole group to analyze the patterns in the ordered pairs in their tables. Ask questions such as: |
| **Questions for Students:**   * *What are some strategies you used to guess the mystery constant function?* * *Are any of your sets of data like those of another group? How can you explain this?* * *What patterns did you notice in your tables? How did you describe these patterns?* * *Which operations were the most difficult to guess in your mystery constant functions? Why do you think this is true?* * *What discoveries did you make?* |
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| |  |  | | --- | --- | | |  | | --- | | **Using the Calculator**  •  *How did you use your calculator to help you make predictions?*  •  *If you did not hide the constant, what would the calculator display?*  •  *How did you use your calculator to discover the patterns in the ordered pairs in your table(s)* | | |
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| **Continuing the Investigation** | |
| Have students:   * If students have also completed *Area Patterns* and/or *Perimeter Patterns,* choose a pattern from one of those activities and see whether they can enter a constant function to duplicate the pattern in that table of ordered pairs. * Choose one of their tables of ordered pairs and see whether they can think of a real-life situation it might represent. | |

**SOLUTIONS**



**Focus:** Use the constant function to create a pattern.

The Mysterious Constant

**Collecting and Organizing Data**

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| **Number of times has been pressed** (left side of the display) | **Result**  (right side of the display) |
| **Sample answer:**  **1** | **98** |
| **2** | **96** |
| **3** | **94** |
| **4** | **92** |
| **5** | **90** |
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**Analyzing Data and Drawing Conclusions:**

* A pattern we discovered in our table is:

Possible answer: The numbers in the result column reduce by 2 each time

* I think the constant function my partner entered on the calculator is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ . Answer -2
* **The 95th time the is pressed, the number display will be \_\_\_\_\_\_\_ .  
  We think this because: Student answers will vary. Answers should show an understanding that the pattern would be continued.

**Questions we thought of while we were doing this activity:**