

Composite Functions on the Graphing Calculator

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CALCULATORS: Casio: *fx-9750G Plus* • Casio: *CFX-9850G Series*

Teaching Notes/Lesson Plan

Objective

The students will be able to find the value of composite functions using a graphing calculator and use composite functions to solve word problems.

Engage

Discuss with students what is meant by composite functions and how the range of the first function becomes the domain of the second function.

Explore

1. Using the calculator, model how to enter the functions into the function memory.
2. Demonstrate how to find the value of a function for a given value.
3. Demonstrate how to find a composite function for two or more variables.
4. Have students solve word problems involving composite functions.

Explain

Review the algebra behind composite functions and their uses.

Elaborate

Students will be given several functions to enter into the calculator. They will then find the value of different composite functions. The students will then verify the results algebraically.

Evaluate

The student will be able to find the value of a given composite function.

Extension

1. Have students find the value of composite functions for irrational and imaginary values.
2. Have students develop their own word problems to share with the class.

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Student Worksheet: Composite Functions

Objectives

1. Given a set of functions, the student will find the value of several composite functions.
2. Given a word problem, the student will set up a group of functions to solve the problem and find the solution.

Introduction

Composite functions are employed when the range of a given function becomes the domain of a second function. One example would be the calculation of the whole sale price of an item, such as a car, is calculated and used in a function that is used to determine the list price.

Materials

- a. Table of Functions

Function	Memory	Expression
$f(x)$	f_1	$x + 4$
$g(x)$	f_2	$5x - 3$
$h(x)$	f_3	$x^2 - 5x + 1$
$k(x)$	f_4	_____

- b. Graphing Calculator

Instructions:

1. Enter the functions into the Function Memory of the calculator.
2. Complete the table for the various composite functions.
3. Set up the functions for the word problems.
4. Solve the word problems.

Problems

Complete the table using the table of composite functions.

Composite Function	$x =$	Value of Function	$x =$	Value of Function	$x =$	Value of Function
$(f_1 \circ f_2)(x)$	-2		3		.25	
$(f_2 \circ f_1)(x)$	-1		5		.5	
$(f_3 \circ f_4)(x)$	-4		8		1.25	
$(f_4 \circ f_3)(x)$	-3		10		.4	

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Student Worksheet: Composite Functions

Solve the following problems.

1. A store owner purchases items and adds 50% of the wholesale price w to get the retail price r . If, at the end of six months an item does not sell, the store owner reduces the price by 20%.
 - a. Write a function to represent the retail price r in terms of the wholesale price w . Store this function in f1. Function: _____
 - b. Write a function to represent the sale price s in terms of the retail price. Store this function in f2. Function: _____
 - c. Write a composite function that could be used to find the sale price.
Composite Function: _____
 - d. Find the sale price of an item that was originally purchased:
For \$75 ; _____ For \$200 ; _____ For \$500 ; _____

2. A car dealer is known to add 80% of the wholesale price w of a car to get the list price p . He also advertises that those in the military get a discount of 25% off the list price.
 - a. Write a function to represent the discounted price d of a car for military personnel in terms of the list price. Store this in f3. Function: _____
 - b. Write a function to represent the wholesale price w of a car in terms of the list price p .
Function: _____
 - c. Write a composite function that could be used to find the wholesale price of a car that was purchased by a person in the military. Function: _____
 - d. Find the wholesale cost for each of the given cars if purchased by military personnel.
For \$12,500; _____ For \$20,000; _____ For \$32,500; _____

Calculator Notes: Composite Functions on the Graphing Calculator

1. Turn on the calculator and highlight the **RUN** Menu. Press **EXE**. Press **OPTN F6 F6** and **F3**. The screen should look like the one on the right.



2. Type in the first function, $x + 4$, and press **F1** twice. The screen should look like the one on the right. Press **AC** and enter the next function. Press **F1** and **F2** to store the function in f2. Continue with the third and fourth functions. The screen will look like the one on the right.



Finding the Value of the Composite Function:

3. Press **F3** to get ready to use the functions. Enter **-2**, press the **→** and **x** to store the value in x . Press **F1** to get the value of the first function. Now press the **arrow key** and **x** to store this value and the domain of f1. Press **F2** to get the value of the composite function. The screen should look like the one on the right.

