# Function Homework – Problems: Composite Functions*

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**Abstract**

This module provides practice problems designed to develop some concepts related to composite functions.

**Exercise 1**

An inchworm (exactly one inch long, of course) is crawling up a yardstick (guess how long that is?). After the first day, the inchworm's head (let's just assume that's at the front) is at the 3" mark. After the second day, the inchworm's head is at the 6" mark. After the third day, the inchworm's head is at the 9" mark.

Let $d$ equal the number of days the worm has been crawling. (So after the first day, $d = 1$.) Let $h$ be the number of inches the head has gone. Let $t$ be the position of the worm's tail.

**a.** After 10 days, where is the inchworm's head? _____

**b.** Its tail? _____

**c.** Write a function $h(d)$ that gives the number of inches the head has traveled, as a function of how many days the worm has been traveling. _____

**d.** Write a function $t(h)$ that gives the position of the tail, as a function of the position of the head. _____

**e.** Now write the composite function $t(h(d))$ that gives the position of the tail, as a function of the number of days the worm has been traveling.

**Exercise 2**

The price of gas started out at 100¢/gallon on the 1st of the month. Every day since then, it has gone up 2¢/gallon. My car takes 10 gallons of gas. (As you might have guessed, these numbers are all fictional.)

Let $d$ equal the date (so the 1st of the month is 1, and so on). Let $g$ equal the price of a gallon of gas, in cents. Let $c$ equal the total price required to fill up my car, in cents.

**a.** Write a function $g(d)$ that gives the price of gas on any given day of the month. _____

**b.** Write a function $c(g)$ that tells how much money it takes to fill up my car, as a function of the price of a gallon of gas. _____

**c.** Write a composite function $c(g(d))$ that gives the cost of filling up my car on any given day of the month.

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**d.** How much money does it take to fill up my car on the 11th of the month? First, translate this question into function notation—then solve it for a number.

**e.** On what day does it cost 1,040¢ (otherwise known as \$10.40) to fill up my car? First, translate this question into function notation—then solve it for a number.

**Exercise 3**

Make up a problem like numbers 1 and 2. Be sure to take all the right steps: **define the scenario, define your variables clearly**, and then show the (composite) functions that relate the variables.

**Exercise 4**

$f(x) = \frac{x}{x^2+3x+4}$ . Find $f(g(x))$ if...

**a.** $g(x) = 3$
**b.** $g(x) = y$
**c.** $g(x) = \text{oatmeal}$
**d.** $g(x) = \sqrt{x}$
**e.** $g(x) = (x+2)$
**f.** $g(x) = \frac{x}{x^2+3x+4}$

**Exercise 5**

$h(x) = 4x$. $h(i(x)) = x$. Can you find what function $i(x)$ is, to make this happen?