

1.4 Building Functions from Functions

Target 1B: Build functions from functions (composition & inverse)

Review of Prior Concepts

If $f(x) = x^2 + 3$ and $g(x) = x - 1$, state the domain of $f(x)$ and $g(x)$. Then, find and state the domain of each:

$(f + g)(x)$

$(f - g)(x)$

$(fg)(x)$

$(f/g)(x)$

More Practice**Operations on Functions**<https://www.youtube.com/watch?v=z8T-QeTVDuQ><https://www.khanacademy.org/math/algebra2/manipulating-functions/combining-functions/a/introduction-to-combining-functions>http://www.algebralab.org/lessons/lesson.aspx?file=Algebra_FunctionsRelationsOperations.xml<https://www.mathsisfun.com/sets/functions-operations.html>

SAT Connection**Passport to Advanced Math****14.** Use structure to isolate or identify a quantity of interest

Example:

$$a = 1,052 + 1.08t$$

The speed of a sound wave in air depends on the air temperature. The formula above shows the relationship between a , the speed of a sound wave, in feet per second, and t , the air temperature, in degrees Fahrenheit ($^{\circ}\text{F}$).

Which of the following expresses the air temperature in terms of the speed of a sound wave?

A) $t = \frac{a - 1,052}{1.08}$

B) $t = \frac{a + 1,052}{1.08}$

C) $t = \frac{1,052 - a}{1.08}$

D) $t = \frac{1.08}{a + 1,052}$

Solution**Operations on Functions**

- Sum
- Difference
- Product
- Quotient
- Composition



Example 1:

If $f(x) = x^2 + 3$ and $g(x) = x - 1$, find and state the domain of $(f \circ g)(x)$ and $(g \circ f)(x)$. Then, find $(f \circ g)(-5)$.

Example 2:

If $f(x) = \sqrt{3 - x}$ and $g(x) = 2x + 8$, state the domain of $f(x)$ and $g(x)$. Then, find and state the domain of $(f \circ g)(x)$ and $(g \circ f)(x)$. Finally, find $g(f(-6))$.

Example 3:

If $f(g(x)) = (x + 2)^5$, find the two functions, $f(x)$ and $g(x)$.

More Practice

Composition Functions

<https://www.youtube.com/watch?v=S4AEZEITPD0>

<https://www.youtube.com/watch?v=kAqaPxusaDg>

https://www.youtube.com/watch?v=_zy7Uro7iCg

<https://www.youtube.com/watch?v=VsNaX9s1nas>

<https://www.khanacademy.org/math/algebra2/manipulating-functions/function-composition/v/function-composition>

<http://home.windstream.net/okrebs/page42.html>

<https://www.math10.com/en/algebra/functions/operations-on-functions.html>

Homework Assignment

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SAT Connection**Solution**

Choice A is correct. Subtracting 1,052 from both sides of the equation $a = 1,052 + 1.08t$ gives $a - 1,052 = 1.08t$. Then dividing both sides of $a - 1,052 = 1.08t$ by 1.08 gives $t = \frac{a - 1,052}{1.08}$.

Choices B, C, and D are incorrect and could arise from errors in rewriting $a = 1,052 + 1.08t$. For example, choice B could result if 1,052 is added to the left side of $a = 1,052 + 1.08t$ and subtracted from the right side, and then both sides are divided by 1.08.