Topic 5.5 Function Operations

Essential Question:

How do you combine, multiply, divide, and compose functions, how do you find the domain of the resulting function?

Model & Discuss

Complete online.

CONCEPT: Composite Function

A **composite function** is the result of applying the rule for one function, f, to the rule of another function, g. The new rule is denoted as $f \circ g$.

 $(f \circ g)(x) = f(g(x))$

The operation • that forms a composite functions is called composition of functions.

The domain of $f \circ g$ is the set of all real numbers x in the domain of g such that g(x) is in the domain of f.

So the domain of the composition is the intersection of the domains of g and $f \circ g$, but not f.

Functio	Function Operations			
	Add or Subtract Functions	Multiply or Divide Functions	Compose Functions	
ALGEBR	A $(f+g)(x) = f(x) + g(x)$ (f-g)(x) = f(x) - g(x)	$(f \cdot g)(x) = f(x) \cdot g(x)$ $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$	$(f \circ g)(x) = f(g(x))$ $(g \circ f)(x) = g(f(x))$	
WORD	5 The domain of the sum or difference of f and g is the intersection of the domain of f and the domain of g.	The domain is the set of all real numbers for which <i>f</i> and <i>g</i> and the new function are defined.	The domain of $f \circ g$ is the set of all real numbers x , in the domain of g , such that $g(x)$ is in the domain of f .	
NUMBER	For $f(x) = 3x + 5$ and g(x) = x - 3, $f + g =(3x + 5) + (x - 3) = 4x + 2and f - g = (3x + 5) -(x - 3) = 2x + 8$	For $f(x) = 3x + 5$ and $g(x) = x - 3$, $f \cdot g =$ $(3x + 5)(x - 3) = 3x^2 -$ $4x - 15$ and $\frac{f}{g} = \frac{3x + 5}{x - 3}$ for $x \neq 3$	For $f(x) = 3x + 5$ and $g(x) = x - 3$, $f \circ g =$ 3(x - 3) + 5 = 3x - 4 and $g \circ f = (3x + 5) - 3 =$ 3x + 2	

Examples & Questions

Examples 1

Q: How do you combine functions by addition or subtraction?

Q: How do you know that the combined function has the same domain as the two original functions?

Q: What new notation is used in the example and what does it mean?

Examples 2

Q: How does the example involve multiplying functions?

Q: How do you multiply two function?

Q: For the demand function d(x) and the price function p(x), is $d(x) \cdot p(x)$ equal $p(x) \cdot d(x)$?

Examples 3

Q: How are the domains of g and $\frac{f}{g}$ different?

Examples 4

Q: What is the difference between the two notations $f(x) \cdot g(x)$ and f(g(x))?

Examples 5

Q: What notation is introduced in the example and what does it mean? Q: What procedure do you perform to find the rule for $f \circ g$?

Examples 6

Q: Why does order matter for discounts?

Practice and Problem Solving

Complete MathXL for School: Practice and Problem Solving (online) Complete MathXL for School: Enrichment (online)

Challenge: #16, 32 - key will be posted in Power School Learning.

Lesson Quiz 5.5/Notes