LESSON MAKER PRO

Function Mashups

Build new rules by linking functions in order.

HIGH SCHOOL · MA.912.F.3

MA.912.F.3 "Create new functions from existing functions."

NAME _____ DATE _____

COMPOSE IN ORDER

To make a composite function, feed the output of the inside function into the outside function. In (f o g)(x), do g first, then substitute its whole output wherever you see x in f. Use parentheses around the inside rule before you simplify.

WORKED EXAMPLE

Let f(x) = 4x - 9 and g(x) = x + 5. Find (f o g)(x).

1. (f o g)(x) = f(g(x))
2. = f(x + 5)
3. = 4(x + 5) - 9
4. = 4x + 11

Answer: (f o g)(x) = 4x + 11

PRACTICE 6 problems

1 Let f(x) = 2x + 1 and g(x) = x + 3. Find (f o g)(x).

ANSWER _____

2 Let p(x) = x^2 + 6 and q(x) = 3x. Find (q o p)(x).

ANSWER _____

3 Let h(x) = 7x - 2 and k(x) = x^2. Find (h o k)(x).

ANSWER _____

4 Let r(x) = x + 8 and s(x) = 2x. Find (r o s)(-1).

ANSWER _____

5 Let a(x) = x^2 + 2 and b(x) = x - 1. Find (b o a)(x).

ANSWER _____

6 Let m(x) = 6x - 1 and n(x) = x + 2. Find (n o m)(x).

ANSWER _____

APPLY IT Show your work

1 A student posts x short videos for a school club. The sharing function is $g(x) = 2x + 1$, where the output is the number of shares. The club point function is $f(x) = 7x + 3$, where the input is the number of shares. Find $f(g(x))$. Then state what the new function tells you.

WORK SPACE

ANSWER _____

2 A student orders x custom stickers for a team fundraiser. The price before a coupon is $p(x) = 8x + 6$ dollars. A coupon changes any price using $c(x) = x - 7$. Find $c(p(x))$, then find the final cost when $x = 3$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Let $f(x) = 2x + 3$, $g(x) = x^2 + 1$, and $h(x) = x + 3$. Find $f(g(h(x)))$. Show the substitution steps.

WORK SPACE AND ANSWER

ANSWER KEY

Function Mashups

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Let f(x) = 2x + 1 and g(x) = x + 3. Find (f o g)(x).	**(f o g)(x) = 2x + 7**
2	Let p(x) = x^2 + 6 and q(x) = 3x. Find (q o p)(x).	**(q o p)(x) = $3x^2$ + 18**
3	Let h(x) = 7x - 2 and k(x) = x^2. Find (h o k)(x).	**(h o k)(x) = $7x^2$ - 2**
4	Let r(x) = x + 8 and s(x) = 2x. Find (r o s)(-1).	**6**
5	Let a(x) = x^2 + 2 and b(x) = x - 1. Find (b o a)(x).	**(b o a)(x) = x^2 + 1**
6	Let m(x) = 6x - 1 and n(x) = x + 2. Find (n o m)(x).	**(n o m)(x) = 6x + 1**

PART 2 · APPLY IT

1. **f(g(x)) = 14x + 10. It gives the club's points from x posted videos.** Substitute 2x + 1 into f: f(g(x)) = 7(2x + 1) + 3 = 14x + 10. The composite connects videos directly to club points.
2. **c(p(x)) = 8x - 1, and the final cost for 3 stickers is $23.** Apply the coupon to the full price: c(p(x)) = (8x + 6) - 7 = 8x - 1. Substituting x = 3 gives 23.

CHALLENGE

h(x) = x + 3; g(h(x)) = $(x + 3)^2$ + 1 = x^2 + 6x + 10; f(g(h(x))) = $2x^2$ + 12x + 23.

Accept equivalent forms that correctly preserve the order of composition, such as 2(x + 3) + 1 for Problem 1. For word problems, accept a correct formula with an accurate context statement and dollar notation.