LESSON MAKER PRO

Function Fusion Lab

Build new functions by adding, subtracting, multiplying, and dividing.

HIGH SCHOOL · MA.912.F.3.3

MA.912.F.3.3 "Solve mathematical and real-world problems involving functions that have been combined using arithmetic operations."

NAME _____ DATE _____

COMBINE FUNCTION RULES

You can combine functions by adding, subtracting, multiplying, or dividing their outputs. For example, (f+g)(x)=f(x)+g(x) and (f/g)(x)=f(x)/g(x). When dividing functions, the denominator function cannot equal 0.

WORKED EXAMPLE

Let f(x)=12x+13 and g(x)=x-14. Find (f-g)(5).

1. (f-g)(5)=f(5)-g(5).
2. f(5)=12(5)+13=73.
3. g(5)=5-14=-9.
4. (f-g)(5)=73-(-9)=82.

Answer: 82

PRACTICE 6 problems

1 Let f(x)=2x+1 and g(x)=6-x. Find (f+g)(x).

ANSWER _____

2 Let $p(x)=x^2+4$ and q(x)=3x-2. Find (p-q)(x).

ANSWER _____

3 Let m(x)=7x and n(x)=x+1. Find (m n)(x), the product of the functions.

ANSWER _____

4 Let a(x)=3x+8 and b(x)=x-2. Find (a/b)(6).

ANSWER _____

5 Let $r(x)=x^2+1$ and s(x)=2x+3. Find (r+s)(-2).

ANSWER _____

6 Let f(x)=4x+1 and g(x)=2x+8. Solve (f+g)(x)=27.

ANSWER _____

APPLY IT Show your work

1 You run an online sticker shop. Your revenue is R(x)=8x dollars, and your costs are C(x)=2x+18 dollars, where x is the number of sticker packs sold. Profit is P(x)=R(x)-C(x). Find your profit when you sell 9 packs.

WORK SPACE

ANSWER _____

2 You sell custom phone cases. Your revenue is R(x)=11x dollars, and your expenses are E(x)=3x+20 dollars. Profit is P(x)=R(x)-E(x). How many cases must you sell to earn a profit of at least 44 dollars?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Let $f(x)=x^2-16$ and $g(x)=x-4$. The quotient function is $h(x)=f(x)/g(x)$. Simplify h(x), then explain why h(4) is still undefined.

WORK SPACE AND ANSWER

Function Fusion Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Let f(x)=2x+1 and g(x)=6-x. Find (f+g)(x).	**x+7**
2	Let p(x)=x^2+4 and q(x)=3x-2. Find (p-q)(x).	**x^2-3x+6**
3	Let m(x)=7x and n(x)=x+1. Find (m n)(x), the product of the functions.	**7x^2+7x**
4	Let a(x)=3x+8 and b(x)=x-2. Find (a/b)(6).	**13/2**
5	Let r(x)=x^2+1 and s(x)=2x+3. Find (r+s)(-2).	**4**
6	Let f(x)=4x+1 and g(x)=2x+8. Solve (f+g)(x)=27.	**x=3**

PART 2 · APPLY IT

1. **36 dollars** Compute P(9)=R(9)-C(9)=8(9)-[2(9)+18]=72-36=36.
2. **8 cases** Set 11x-(3x+20) greater than or equal to 44. Solving 8x-20 greater than or equal to 44 gives x greater than or equal to 8, so the minimum is 8 cases.

CHALLENGE

h(x)=x+4, where x is not 4. h(4) is undefined because the original denominator, g(4)=4-4, equals 0.

Accept equivalent algebraic forms for the combined-function expressions. For the challenge, require both the simplified rule and the restriction x is not 4.