

Function Mashups

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

HIGH SCHOOL • AII-F.BF.1.b

AII-F.BF.1.b "Combine standard function types using arithmetic operations."

NAME _____

DATE _____

COMBINE THE OUTPUTS

To add, subtract, or multiply functions, perform that operation on their outputs: $(u+v)(x)=u(x)+v(x)$, $(u-v)(x)=u(x)-v(x)$, and $(uv)(x)=u(x)v(x)$. For a quotient, use $(u/v)(x)=u(x)/v(x)$, but exclude any x -value that makes $v(x)=0$.

WORKED EXAMPLE

Let $f(x)=2x+7$ and $g(x)=x-3$. Find $(f-g)(x)$.

1. $(f-g)(x)=f(x)-g(x)$
2. $(f-g)(x)=(2x+7)-(x-3)$
3. $(f-g)(x)=2x+7-x+3=x+10$

Answer: $(f-g)(x)=x+10$

PRACTICE 6 problems

1 Let $f(x)=4x-1$ and $g(x)=5x+6$. Find $(f+g)(x)$.

ANSWER _____

2 Let $h(x)=x^2+8$ and $k(x)=6x-4$. Find $(h-k)(x)$.

ANSWER _____

3 Let $m(x)=x+10$ and $n(x)=x-5$. Find $(mn)(x)$.
Write your answer in standard form.

ANSWER _____

4 Let $r(x)=24x^2+40x$ and $s(x)=4x$. Find $(r/s)(x)$.

ANSWER _____

5 Let $f(x)=11x-9$ and $g(x)=x^2+13$. Find $(f+g)(-4)$.

ANSWER _____

6 Let $q(x)=32x+48$ and $r(x)=8$. Find $(q/r)(x)$.

ANSWER _____

APPLY IT Show your work

- 1** A student sells custom shirts online. The revenue, in dollars, from selling x shirts is $R(x)=16x+90$. The cost, in dollars, is $C(x)=8x+145$. Write the profit function $P(x)=R(x)-C(x)$.

WORK SPACE

ANSWER _____

- 2** For x days, Maya tracks mobile data used by music streaming with $M(x)=5x+12$ and video calls with $V(x)=4x+9$, where outputs are in gigabytes. Write a function $T(x)$ for her total data use.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Let $p(x)=x^2-25$ and $q(x)=x-5$. Define $h(x)=p(x)/q(x)$. Simplify $h(x)$, then state the x -value that must still be excluded. Explain why it is excluded.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Let $f(x)=4x-1$ and $g(x)=5x+6$. Find $(f+g)(x)$.	$(f+g)(x)=9x+5$
2	Let $h(x)=x^2+8$ and $k(x)=6x-4$. Find $(h-k)(x)$.	$(h-k)(x)=x^2-6x+12$
3	Let $m(x)=x+10$ and $n(x)=x-5$. Find $(mn)(x)$. Write your answer in standard form.	$(mn)(x)=x^2+5x-50$
4	Let $r(x)=24x^2+40x$ and $s(x)=4x$. Find $(r/s)(x)$.	$(r/s)(x)=6x+10, x \neq 0$
5	Let $f(x)=11x-9$ and $g(x)=x^2+13$. Find $(f+g)(-4)$.	-24
6	Let $q(x)=32x+48$ and $r(x)=8$. Find $(q/r)(x)$.	$(q/r)(x)=4x+6$

PART 2 • APPLY IT

- $P(x)=8x-55$** Subtract the cost function from the revenue function. Combine like terms:
 $16x+90-(8x+145)=8x-55$.
- $T(x)=9x+21$** Total data use is the sum of the two functions. Add corresponding terms:
 $(5x+12)+(4x+9)=9x+21$.

CHALLENGE

$h(x)=x+5$, with $x \neq 5$. Since $q(5)=0$, the original quotient is undefined at $x=5$, even though $x-5$ cancels after factoring.

Accept algebraically equivalent forms, including factored forms when they represent the same function. For quotient answers, require any domain restriction caused by a zero denominator.