

Combining Functions

Algebra 1 • Section 4.9

Name: _____

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Quick Review and Helpful Hints

A function pairs each input with exactly one output. Pay attention to what the input means, what rule is being applied, and whether the question asks for a value, a rule, a domain, or an interpretation.

▶ **Example:** For $f(x) = 2x + 5$, find $f(4)$.

Work: Replace x with 4: $f(4) = 2(4) + 5 = 13$.

★ **Answer:** 13

◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. If $f(x) = 2x + 1$ and $g(x) = x - 4$, find $(f + g)(x)$. _____

6. If $f(3) = 10$ and $g(3) = -2$, find $(fg)(3)$. _____

2. Find $(f - g)(x)$ for $f(x) = 5x + 2$, $g(x) = x - 7$. _____

7. For $f(x) = x^2$ and $g(x) = 3x$, find $(f + g)(4)$. _____

3. Find $(fg)(x)$ for $f(x) = x + 3$, $g(x) = x - 2$. _____

8. For $f(x) = 2x$ and $g(x) = x + 5$, find $(f \circ g)(x)$. _____

4. Find $\left(\frac{f}{g}\right)(x)$ for $f(x) = x + 1$, $g(x) = x - 5$. _____

9. For $f(x) = x - 1$ and $g(x) = x^2$, find $(g \circ f)(x)$. _____

5. If $f(2) = 7$ and $g(2) = 4$, find $(f + g)(2)$. _____

10. Find the domain of $\frac{x+2}{x^2-4}$. _____

◆ Word Problems

11. A discount function subtracts 5, and a tax function multiplies by 1.08. Write tax after discount for price p . _____

12. A height function is $h(t) = 40 + 3t$ and a bonus function adds 8. Write the combined output. _____



Answer Keys

- | | |
|--------------------------------|--------------------|
| 1. $3x - 3$ | 7. 28 |
| 2. $4x + 9$ | 8. $2x + 10$ |
| 3. $x^2 + x - 6$ | 9. $(x - 1)^2$ |
| 4. $\frac{x+1}{x-5}, x \neq 5$ | 10. $x \neq -2, 2$ |
| 5. 11 | 11. $1.08(p - 5)$ |
| 6. -20 | 12. $48 + 3t$ |

Step-by-Step Explanations

- Adding functions just means stacking their expressions and gathering like terms.
- Subtract the entire second function, so distribute that minus: $5x + 2 - (x - 7) = 4x + 9$.
- Multiplying functions means multiplying the binomials — FOIL through: $x^2 - 2x + 3x - 6$.
- Stack one over the other, but remember the bottom can't be zero, so $x = 5$ is banned.
- When both are evaluated at the same input, you just add the outputs: $7 + 4 = 11$.
- For a product at one input, multiply the two outputs together: 10 times -2 is -20 .
- Evaluate each at 4 first — 16 and 12 — then combine them for 28.
- Composition means g goes inside f : feed $x + 5$ into f , getting $2(x + 5) = 2x + 10$.
- Now f runs first and its result enters g , so you square the whole $x - 1$.
- Factor the denominator into $(x - 2)(x + 2)$ and exclude whatever makes it zero — both 2 and -2 .
- Order matters: knock off the \$5 first, then the 1.08 tax acts on that lowered price.
- Tacking the bonus on top means $h(t) + 8$, and $40 + 8$ merges into $48 + 3t$.



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