

Combining Functions

Name: _____ Date: _____ Score: _____ / 26

Quick Review

Functions can be combined just like numbers: **add** $(f + g)(x) = f(x) + g(x)$; **subtract** $(f - g)(x) = f(x) - g(x)$; **multiply** $(f \cdot g)(x) = f(x) \cdot g(x)$; **divide** $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$ (as long as $g(x) \neq 0$). After combining the expressions, simplify — combine like terms, factor when possible. For division, the domain excludes any x that makes the denominator zero. To evaluate a combination at a number, you can either combine first and then substitute, or substitute into each function first and then combine. Either way works.

PRACTICE

Let $f(x)=2x+5$ and $g(x)=x^2-1$ unless stated otherwise.

- | | |
|--|---|
| 1. $(f + g)(x)$ _____ | 11. $p(x) = 6x, q(x) = 3; \left(\frac{p}{q}\right)(x)$ _____ |
| 2. $(f - g)(x)$ _____ | 12. $p(x) = x^2 + x, q(x) = x; \left(\frac{p}{q}\right)(x)$ _____ |
| 3. $(f \cdot g)(1)$ _____ | 13. $f(x) = 3, g(x) = x; (f + g)(5)$ _____ |
| 4. $\left(\frac{g}{f}\right)(x)$ _____ | 14. $f(x) = x^2, g(x) = x; (f - g)(4)$ _____ |
| 5. $(f + g)(0)$ _____ | 15. $(f \cdot g)(0)$ _____ |
| 6. $(f - g)(3)$ _____ | 16. $(2f)(x)$ _____ |
| 7. $(g \cdot f)(-1)$ _____ | 17. $(f + g)(-2)$ _____ |
| 8. Domain of $\frac{f}{g}$ _____ | 18. $\left(\frac{f}{f}\right)(x) (x \neq -\frac{5}{2})$ _____ |
| 9. $h(x) = x, k(x) = 4x - 3; (h + k)(2)$ _____ | 19. $h(x) = 2x, k(x) = 3x; (h + k)(x)$ _____ |
| 10. $h(x) = x + 1, k(x) = x - 1; (h \cdot k)(x)$ _____ | 20. $f(x) = x + 2, g(x) = x - 2; (f \cdot g)(x)$ _____ |

VISUAL PRACTICE

Use the graph, table, chart, or diagram to answer the question.

21. Use the tables to find $f(g(2))$.

| | | | |
|--------|---|---|---|
| x | 1 | 2 | 3 |
| $g(x)$ | 3 | 1 | 2 |
| $f(x)$ | 4 | 7 | 9 |

Answer: _____

22. Use the tables to find $(f + g)(2)$.

| | | | |
|--------|---|---|---|
| x | 1 | 2 | 3 |
| $f(x)$ | 4 | 6 | 8 |
| $g(x)$ | 3 | 5 | 7 |

Answer: _____

Word Problems

23. A store's revenue is $R(x) = 12x$ and cost is $C(x) = 5x + 200$. Write profit $P = R - C$ and find break-even ($P = 0$). _____
24. A rectangular poster has area $A(x) = x(x + 4)$. A border adds 2 inches to every side, so the new area is $B(x) = (x + 4)(x + 8)$. Find $(B - A)(3)$ and interpret it. _____
25. A truck's fuel is $F(t) = 20 - 2t$ gallons after t hours. Cost per gallon is $C = 4$. Write total spent so far $S(t) = 4 \cdot (20 - F(t))$. Find $S(5)$. _____
26. Person A walks at 3 mph, B at 4 mph. Write distance functions $D_A(t) = 3t$ and $D_B(t) = 4t$, then find the gap $(D_B - D_A)(2)$ hours. _____



Answer Keys

- | | |
|-------------------------|---------------------------------------|
| 1. $x^2 + 2x + 4$ | 14. 12 |
| 2. $-x^2 + 2x + 6$ | 15. -5 |
| 3. 0 | 16. $4x + 10$ |
| 4. $\frac{x^2-1}{2x+5}$ | 17. 4 |
| 5. 4 | 18. 1 |
| 6. 3 | 19. $5x$ |
| 7. 0 | 20. $x^2 - 4$ |
| 8. $x \neq \pm 1$ | 21. 4 |
| 9. 7 | 22. 11 |
| 10. $x^2 - 1$ | 23. $P(x) = 7x - 200; x \approx 28.6$ |
| 11. $2x$ | 24. 56 |
| 12. $x + 1 (x \neq 0)$ | 25. \$40 |
| 13. 8 | 26. 2 miles |

Step-by-Step Tutor Notes

1. Focus on the main idea of the problem, then simplify carefully. $(2x + 5) + (x^2 - 1) = x^2 + 2x + 4$. So the answer is $x^2 + 2x + 4$.
2. $(2x + 5) - (x^2 - 1) = 2x + 5 - x^2 + 1 = -x^2 + 2x + 6$. (The minus flips the signs inside $(x^2 - 1)$.)
3. First identify the feature of the graph or equation that matches the wording of the question. $f(1) = 7, g(1) = 0$. Product: 0. (Anything times zero is zero.) That leads to 0.
4. Start with the definition the problem is testing, then apply it directly. Just write the ratio: $\frac{x^2-1}{2x+5}$. Domain excludes $x = -\frac{5}{2}$. So the answer is $\frac{x^2-1}{2x+5}$.
5. This is a good place to slow down, check the notation, and simplify cleanly. $f(0) = 5, g(0) = -1$. Sum: $5 + (-1) = 4$. So the answer is 4.
6. Focus on the main idea of the problem, then simplify carefully. $f(3) = 11, g(3) = 8$. Difference: $11 - 8 = 3$. So the answer is 3.
7. $g(-1) = 0, f(-1) = 3$. Product: $0 \cdot 3 = 0$. (Same as $f \cdot g$ — multiplication is commutative.)
8. Focus on the main idea of the problem, then simplify carefully. $g(x) = x^2 - 1 = 0$ when $x = \pm 1$. Exclude those. So the answer is $x \neq \pm 1$.
9. This is a good place to slow down, check the notation, and simplify cleanly. $h(2) = 2, k(2) = 5$. Sum: 7. So the answer is 7.
10. Focus on the main idea of the problem, then simplify carefully. $(x + 1)(x - 1) = x^2 - 1$ (difference of squares). So the answer is $x^2 - 1$.
11. Start with the definition the problem is testing, then apply it directly. $\frac{6x}{3} = 2x$. So the answer is $2x$.
12. Use the clue in the question first, then let the arithmetic finish the job. $\frac{x^2+x}{x} = \frac{x(x+1)}{x} = x + 1$ for $x \neq 0$. So the answer is $x + 1 (x \neq 0)$.
13. This is a good place to slow down, check the notation, and simplify cleanly. $3 + 5 = 8$. So the answer is 8.
14. This is a good place to slow down, check the notation, and simplify cleanly. $f(4) = 16, g(4) = 4$. $16 - 4 = 12$. So the answer is 12.
15. This is a good place to slow down, check the notation, and simplify cleanly. $f(0) = 5, g(0) = -1$. Product: $5 \cdot (-1) = -5$. So the answer is -5.
16. Keep the order of operations in view, then simplify without skipping the sign check. Multiply f by 2: $2(2x + 5) = 4x + 10$. After simplifying, the answer is $4x + 10$.
17. This is a good place to slow down, check the notation, and simplify cleanly. $f(-2) = 1, g(-2) = 3$. Sum: 4. So the answer is 4.
18. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Any nonzero quantity divided by itself is 1. After simplifying, the answer is 1.
19. Use the clue in the question first, then let the arithmetic finish the job. $2x + 3x = 5x$ (combining like terms). So the answer is $5x$.
20. This is a good place to slow down, check the notation, and simplify cleanly. Difference of squares again: $(x + 2)(x - 2) = x^2 - 4$. So the answer is $x^2 - 4$.
21. This is a good place to slow down, check the notation, and simplify cleanly. First, $g(2) = 1$. Then use the table again: $f(1) = 4$. So the answer is 4.
22. Use the clue in the question first, then let the arithmetic finish the job. At $x = 2, f(2) = 6$ and $g(2) = 5$, so $(f + g)(2) = 11$. So the answer is 11.
23. $P(x) = 12x - (5x + 200) = 7x - 200$. Break-even: $7x - 200 = 0$, so $x = \frac{200}{7} \approx 28.6$ items. Round up to 29 to actually profit.
24. $(B - A)(x) = (x + 4)(x + 8) - x(x + 4)$. Factor out $(x + 4)$: $(x + 4)[(x + 8) - x] = (x + 4)(8) = 8(x + 4)$. At $x = 3$: $8(7) = 56$ square units.
25. Gallons used: $20 - F(t) = 20 - (20 - 2t) = 2t$. So $S(t) = 4(2t) = 8t$. At $t = 5$: $S(5) = 40$ dollars.
26. $D_B - D_A = 4t - 3t = t$. At $t = 2$: gap is 2 miles. (B walks 1 mph faster, so after 2 hours B is 2 miles ahead.)



Scan Me

Want a Full Algebra 1 Textbook? Try Our Vermont VTCAP Made Simple Book!



Vermont VTCAP Algebra I Made Ridiculously Simple

The friendly, step-by-step Algebra 1 textbook
Plain-English explanations, guided practice, and
review support.



Full Lessons Inside

Concepts
Practice
Mastery

Important: All our test books contain **unique, completely different tests** from each other! Each book offers fresh practice questions—no repeats!

5 Practice Tests

- ✓ 5 complete practice tests with detailed explanations
- ✓ Perfect foundation for VT CAP test preparation
- ✓ Builds confidence and test-taking skills
- ✓ High-quality questions aligned with state standards

Start your practice journey!

6 Practice Tests

- ✓ 6 complete practice tests with detailed explanations
- ✓ **Unique tests**—different from the 5 tests book
- ✓ Perfect for more practice after mastering 5 tests
- ✓ Builds even more confidence and test-taking skills
- ✓ Same high-quality questions aligned with standards

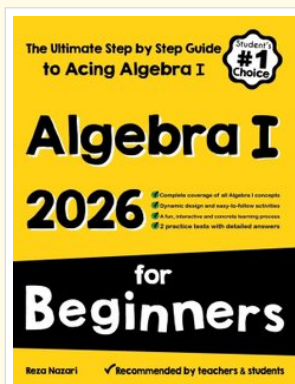
Take your practice to the next level!

7 Practice Tests

- ✓ 7 complete practice tests for maximum preparation
- ✓ **Unique tests**—different from 5 and 6 tests books
- ✓ The most comprehensive practice for Algebra 1
- ✓ Ideal for students aiming for top scores
- ✓ Extensive practice builds mastery and confidence

Go all the way with comprehensive practice!

STUDENT FAVORITE • Master Algebra I From the Ground Up



Algebra I for Beginners

Written by a top math teacher & aligned with national and state Algebra I courses. From linear equations to graphing quadratics — explained the easy way.

- ✓ **Complete coverage** of every Algebra I concept — perfect companion to these worksheets
- ✓ **Step-by-step explanations** with worked examples on every topic
- ✓ **QR codes in every chapter** for free video lessons & bonus practice
- ✓ **2 full-length practice tests** with detailed answer keys

- ✓ 100% Guaranteed
- ✓ Lifetime Support
- ✓ Trusted by Teachers

Start Your Algebra Journey Today! →

★ STUDENT'S #1 CHOICE ★

Teacher-recommended • 12,000+ Happy Students

PDF EDITION



Instant download • any device

PAPERBACK



Paperback on Amazon

Hold it in your hands

Pair these free worksheets with *Algebra I for Beginners* and you have a complete self-paced course — concept lessons, daily practice, and full exam-style reviews, all in one path. →

EffortlessMath.com/product/algebra-i-for-beginners