

Combining Functions Review

1. Given $f(x) = 3x - 1$ and $g(x) = 2x + 7$, determine

a) $(f + g)(4)$

b) $(f + g)(-1)$

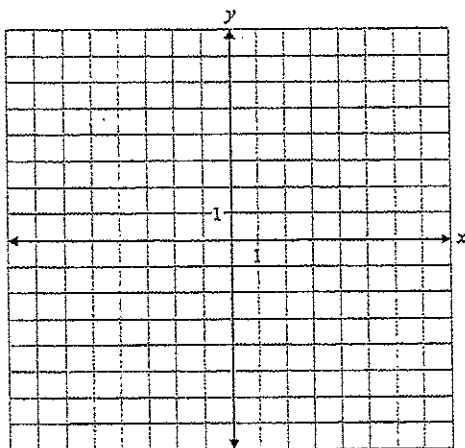
c) $(f - g)(3)$

d) $(g - f)(-5)$

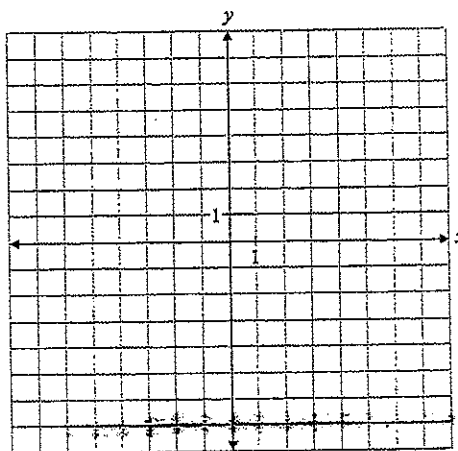
2. Consider the functions $g(x) = x + 2$ and $h(x) = x^2 - 4$.

Determine the equation and sketch the graph of each combined function. Then, state the domain and range.

i. $f(x) = g(x) + h(x)$



ii. $f(x) = h(x) - g(x)$



3. Let $f(x) = \frac{1}{x-1}$ and $g(x) = \sqrt{x}$. Determine the equation of each combined function and state its domain.

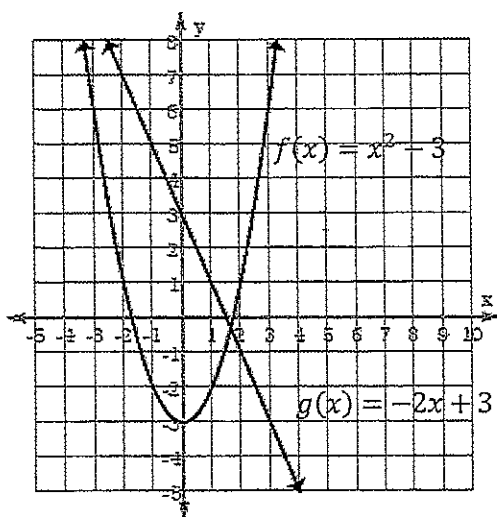
a) $(f + g)(x)$

b) $(f - g)(x)$

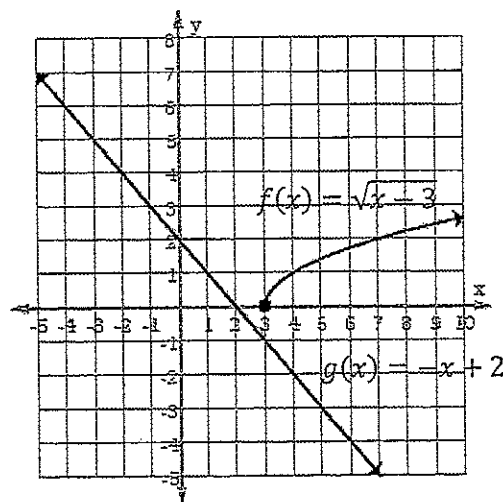
4. For each graph of $f(x)$ and $g(x)$,

- Determine the equation and graph of $y = (f + g)(x)$ and state its domain and range
- Determine the equation and graph of $y = (f - g)(x)$ and state its domain and range

a)



b)



5. Consider the functions $g(x) = x + 2$ and $h(x) = x^2 - 4$. Determine the equation and sketch the graph of each combined function $f(x)$. Then, state the domain and range.

a) $f(x) = g(x)h(x)$

b) $f(x) = \frac{h(x)}{g(x)}$

c) $f(x) = \frac{g(x)}{h(x)}$

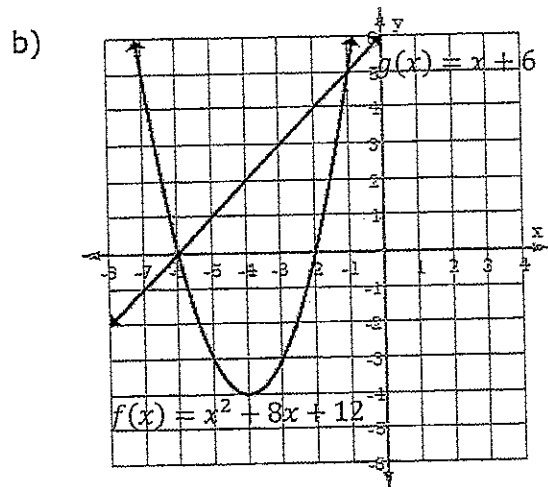
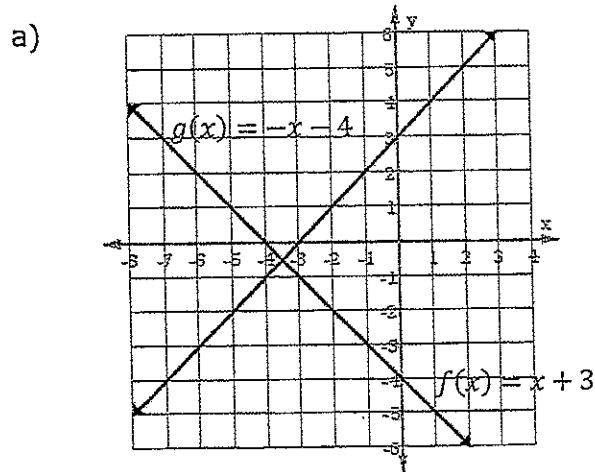
6. Determine the value of $f(-2)$ for each combined function in #5.

7. Given $g(x) = \frac{1}{x+4}$ and $h(x) = \frac{1}{x^2-16}$, determine the equation of each combined function and state its domain.

a) $f(x) = \frac{g(x)}{h(x)}$

b) $f(x) = \frac{h(x)}{g(x)}$

8. For each graph of $f(x)$ and $g(x)$,
- Determine the equation and graph of $y = (f \cdot g)(x)$ and state its domain and range.
 - Determine the equation and graph of $y = \left(\frac{f}{g}\right)(x)$ and state its domain and range.



9. Given $f(x) = x^2$ and $g(x) = x + 1$, determine the following.

a) $f(g(-2))$

b) $g(f(-2))$

10. For $f(x) = 2x^2$ and $g(x) = \frac{4}{x}$, determine the following and state any restrictions.

a) $f(g(x))$

b) $g(f(x))$

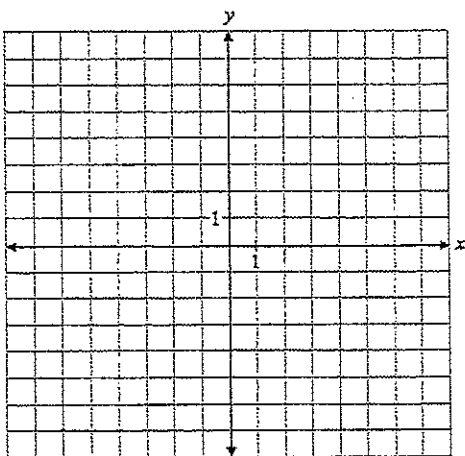
c) $g(f(-2))$

11. Consider $f(x) = -\frac{2}{x}$ and $g(x) = \sqrt{x}$.

a) Determine $y = f(g(x))$.

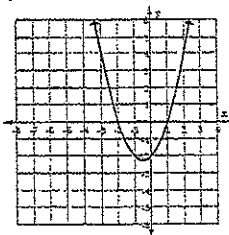
b) State the domain and range of $y = f(g(x))$.

12. If $f(x) = 2x - 5$ and $g(x) = x + 6$, determine $y = (f \circ g)(x)$. Then, sketch the graphs of the three functions.

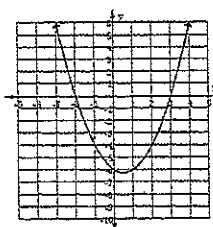


Answer Key

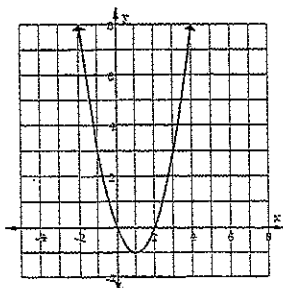
1. a) 26 b) 1 c) -5
 2. i) $f(x) = x^2 + x - 2, D: x \in \mathbb{R}, R: y \in \mathbb{R}$



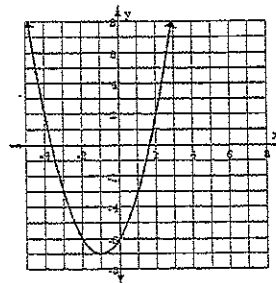
- d) 13 ii) $f(x) = x^2 - x - 6, D: x \in \mathbb{R}, R: y \in \mathbb{R}$



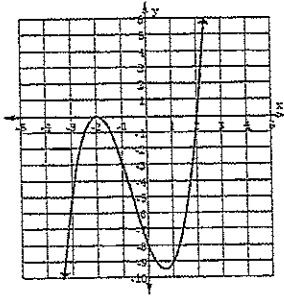
3. a) $y = \frac{1}{x-1} + \sqrt{x}; D: x \geq 0, x \neq 1$
 4. a) $y = x^2 - 2x, D: x \in \mathbb{R}, R: y \geq -1$



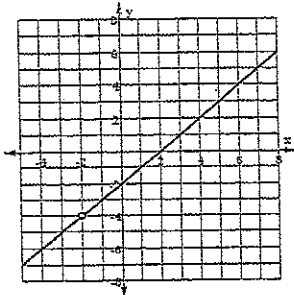
- b) $y = \frac{1}{x-1} - \sqrt{x}, D: x \geq 0, x \neq 1$
 b) $y = x^2 + 2x - 6, D: x \in \mathbb{R}, R: y \geq -7$



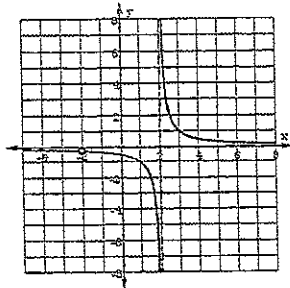
5. a) $f(x) = x^3 + 2x^2 - 4x - 8$, $D: x \in \mathbb{R}$, $R: y \in \mathbb{R}$



b) $f(x) = x - 2, x \neq -2$, $D: x \neq -2$, $R: y \neq -4$



c) $f(x) = \frac{1}{x-2}, x \neq -2, 2$; $D: x \neq -2, 2$; $R: y \neq -\frac{1}{4}, 0$



6. a) 0

b) does not exist

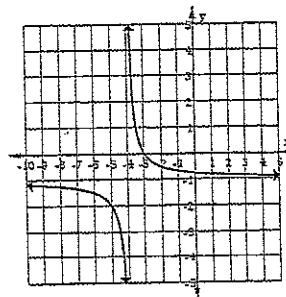
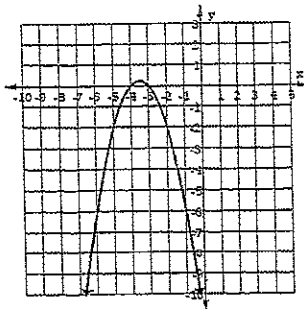
c) does not exist

7. a) $f(x) = x - 4, x \neq \pm 4$, $D: x \neq \pm 4$

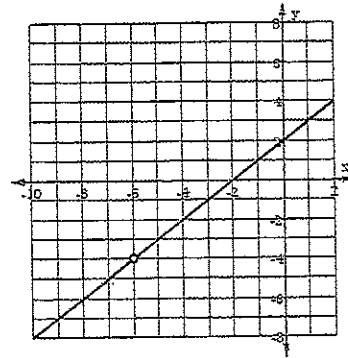
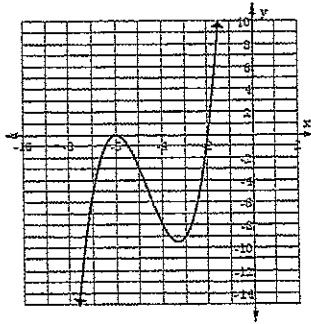
b) $f(x) = \frac{1}{x-4}, x \neq -4$, $D: x \neq \pm 4$

8. a) $y = -x^2 - 7x - 12$, $D: x \in \mathbb{R}$; $R: y \leq \frac{1}{4}$

b) $y = \frac{x+3}{-x-4}, D: x \neq -4$; $R: y \neq -1$



b) $y = x^3 + 14x^2 + 60x + 72$; $D: x \in \mathbb{R}$; $R: y \in \mathbb{R}$ $y = x + 2$, $x \neq -6$; $D: x \neq -6$; $R: y \neq -4$



9. a) 1 b) 5

10.a) $y = \frac{32}{x^2}$; $x \neq 0$

b) $y = \frac{2}{x^2}$; $x \neq 0$

c) 0.5

11.a) $y = -\frac{2}{\sqrt{x}}$, $x > 0$

b) $D: x > 0$; $R: y < 0$

12.

