Name __Key__

1. If $f(x) = 2x + 7$ and $g(x) = -5x - 1$, find $f(g(x))$.

$$f(g(x)) = 2(-5x - 1) + 7$$
$$= -10x - 2 + 7$$
$$= -10x + 5$$

2. If $f(x) = 3 + 2x$ and $g(x) = x - 7$, find $g(f(x))$.

$$g(f(x)) = (3 + 2x) - 7$$
$$= 3 + 2x - 7$$
$$= -4 + 2x$$

3. If $f(x) = 3 + x$ and $g(x) = 3x - 2$, find $f \circ g(x)$.

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

4. If $f(x) = x^2$ and $g(x) = 4x + 5$, find $g \circ f(x)$.

$$g(f(x)) = 4(x^2) + 5$$
$$= 4x^2 + 5$$

5. If $f(x) = \sqrt{2x - 7}$ and $g(x) = 3x - 2$, find $f \circ g$.

$$f(g(x)) = \sqrt{2(3x-2) - 7}$$
$$= \sqrt{6x - 4 - 7}$$
$$= \sqrt{6x - 11}$$

6. If $f(x) = 2 + x$ and $g(x) = 3x^2 + 1$, find $g \circ f$.

$$g(f(x)) = 3(2+x)^2 + 1$$
$$= 3(2+x)(2+x) + 1$$
$$= (6 + 3x)(2 + x) + 1$$

$$= 12 + 6x + 6x + 3x^2 + 1$$
$$= 3x^2 + 12x + 13$$

7. If $f(x) = 3x^2 + x - 2$ and $g(x) = 2x - 5$, find $f \circ g(1)$.

$$g(1) = 2(1) - 5 = -3$$

$$f(-3) = 3(-3)^2 + (-3) - 2 = 27 - 3 - 2 = 22$$

8. If $f(x) = 5 + x^2$ and $g(x) = 9x - 1$, find $g(f(-2))$.

$$g(f(-2)) = 9(5 + (-2)^2) - 1$$
$$= 9(9) - 1$$
$$= 80$$