

Composition of Function Notes

$$f(g(x)) = (f \circ g)(x)$$

Examples

$$f(x) = x^2 - 7$$

$$g(x) = 3x + 2$$

$$h(x) = \sqrt{x+1}$$

1. $f(-3)$

$$f(-3) = (-3)^2 - 7$$

$$= \boxed{2}$$

2. $h(7)$

$$= \sqrt{7+1}$$

$$= \sqrt{8}$$

$$= \boxed{2\sqrt{2}}$$

3. $(f+g)(x)$

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

$$x^2 - 7 + 3x + 2$$

$$= \boxed{x^2 + 3x - 5}$$

4. $(fg)(x)$

$$f(x) \cdot g(x)$$

$$(x^2 - 7)(3x + 2)$$

$$3x^3 - 21x + 2x^2 - 14$$

$$\boxed{3x^3 + 2x^2 - 21x - 14}$$

5. $(f-g)(x)$

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

$$x^2 - 7 - (3x + 2)$$

$$x^2 - 7 - 3x - 2$$

$$= \boxed{x^2 - 3x - 9}$$

6. $(g/h)(x)$ $\frac{g(x)}{h(x)}$

$$\frac{3x+2}{\sqrt{x+1}}$$

$x > -1$
 $(-1, \infty)$

$$x+1 \geq 0$$

7. $g(f(12))$

① $f(12) = 12^2 - 7 = 137$

$$g(137) = 3(137) + 2$$

$$= \boxed{413}$$

8. $f(g(7))$

① $g(7) = 3(7) + 2 = 23$

② $f(23) = 23^2 - 7$

$$= \boxed{522}$$

9. $f(g(x))$

$$f(3x+2)$$

$$= (3x+2)^2 - 7$$

$$= 9x^2 + 12x + 4 - 7$$

$$= \boxed{9x^2 + 12x - 3}$$

$D: (-\infty, \infty)$

10. $(f+g)(2)$

11. $g(f(x))$

$$3(x^2 - 7) + 2$$

$$3x^2 - 21 + 2$$

$$\boxed{3x^2 - 19}$$

$D: (-\infty, \infty)$

* to find domain of $f(g(x))$ you look at domain of $g(x)$ is the final answer